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Thomas F. Prendergast
President

000933

Long Island Rail Road

December 14, 1999

Ms. Letitia Thompson
Regional Administrator
Federal Transit Administration
Region 2-New York Office
One Bowling Green, Room 429
New York, NY 10004

Letitia

Dear Ms. Thompson:

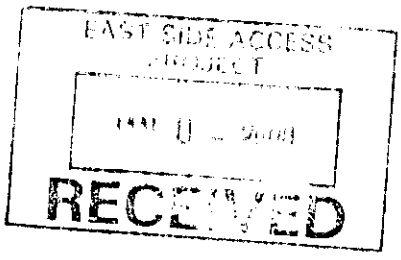
The appendices to the Preliminary Draft Environmental Impact Statement (PDEIS) for the East Side Access project are herewith submitted for your review. The appendices contain technical data and other materials that support the PDEIS analyses in the subject areas of ridership forecasting, noise and vibration, traffic and transportation, and historic and archaeological resources. Six copies are transmitted for the New York Office's review and five copies were distributed directly to others as per the direction of Mr. Steven Faust.

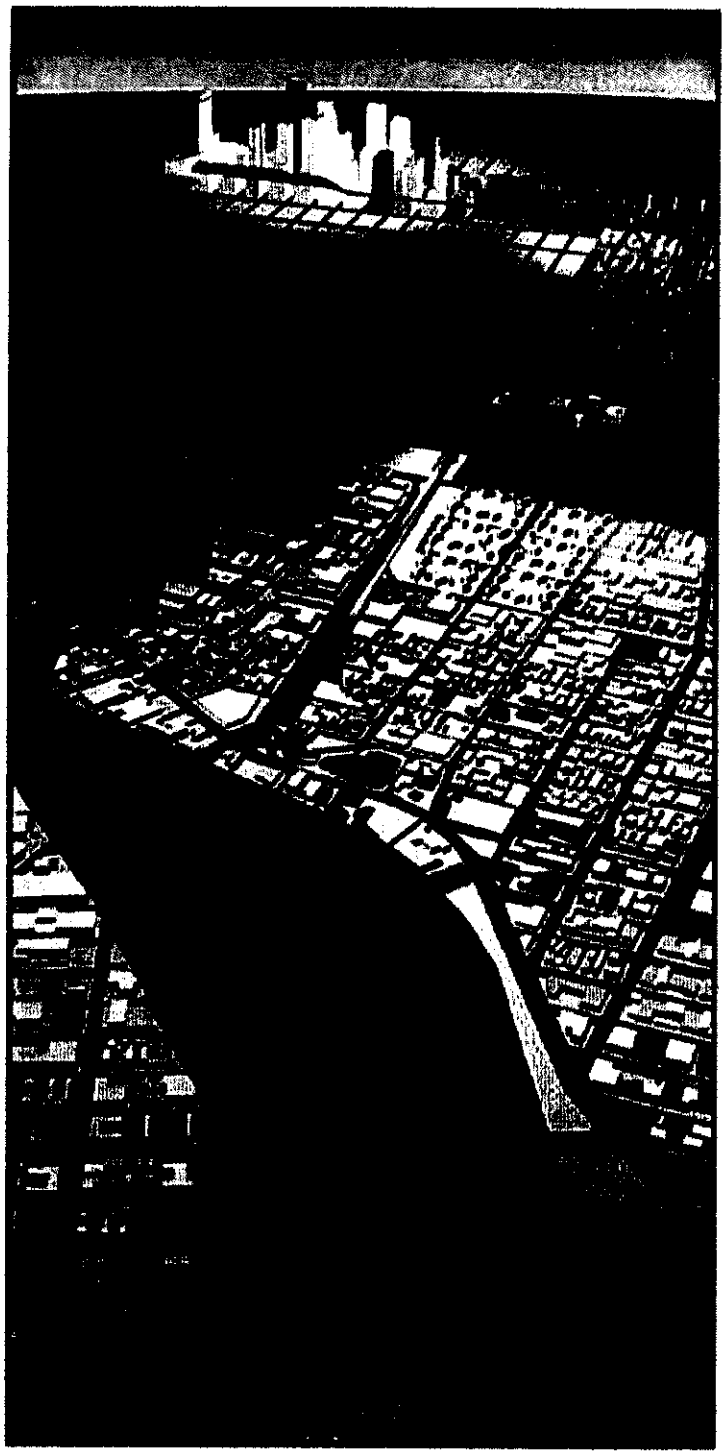
Best Wishes.

Sincerely,

Anthony F. Japha
Chief Program Executive – East Side Access

Cc: Thomas F. Prendergast, President, LIRR
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Maisie Grace, FTA Regional Counsel- (1 copy)
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William Wheeler, MTA Director of Planning
File





MTA Long Island Rail Road

East Side Access

Preliminary Draft Environmental Impact Statement

Appendices

December 1999

United States Department of Transportation
Federal Transit Administration

Metropolitan Transportation Authority
State of New York

EAST SIDE ACCESS

DRAFT ENVIRONMENTAL IMPACT STATEMENT
APPENDICES

IN

NEW YORK, QUEENS, AND BRONX COUNTIES, NEW YORK
AND
NASSAU AND SUFFOLK COUNTIES, NEW YORK

PREPARED BY
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

AND

MTA / LONG ISLAND RAIL ROAD

Submitted pursuant to the National Environmental Policy Act of 1969, §102, 42 U.S.C. §4332; Federal Transit Laws, Title 49 U.S.C. Chapter 53, §5301(e), §5323(b), and §5324(b); Title 49 U.S.C. §303, formerly Department of Transportation Act of 1966, §4(f); National Historic Preservation Act of 1966, §106, 16 U.S.C. §470(f); Executive Order 11990 (Protection of Wetlands); Executive Order 12372 (Intergovernmental Review of Federal Programs); Executive Order 11988 (Flood Plain Management); and Executive Order 12898 (Environmental Justice) and all applicable laws, regulations, orders, and guidelines.

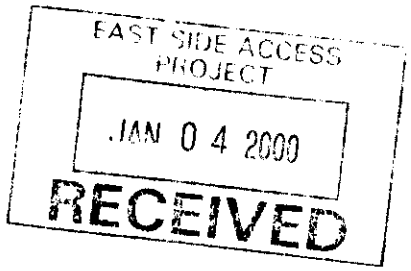


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Appendix A: Ridership Forecasting Results Report

LIRR East Side Access Project
Draft Environmental Impact Statement

DRAFT
Ridership Forecasting Results Report

July 13, 1999

Submitted by:

KPMG LLP

MTA Long Island Rail Road

Version 1.1

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1. INTRODUCTION

This report documents the results of the ridership forecasting process for the Long Island Rail Road East Side Access (LIRR ESA) Draft Environmental Impact Statement (DEIS). The ridership forecasting procedures for the LIRR ESA DEIS are based process embodied in the Metropolitan Transportation Authority Regional Transit Forecasting (MTA RTF) Model. This model was developed as part of the LIRR DEIS project and other on-going MTA transit development projects in the region. The model is a modified 4-step model with trip generation and distribution replaced by a Census/Survey-derived trip table. The model is based on the following sources of information:

- MTA 1995 and 2020 transit networks
- New York City Transit (NYCT) 1995 and 2020 transit networks (inside New York City)
- New York Metropolitan Transportation Council (NYMTC) Interim Analysis Method highway networks and congested speeds
- New York Metropolitan Transportation Council (NYMTC) adopted couny-level forecasts of population, employment, and journey-to-work.
- Sub-county forecasts of population and employment developed by Allee King Rosen and Fleming for Manhattan, Long Island City, and the Brooklyn CBD
- MTA forecasts of sub-county population and employment (elsewhere)
- Mode choice procedures originally developed by KPMG for NJ TRANSIT and customized for the East-of-Hudson market using stated preference research conducted by MVA Consultancy for the Lower Manhattan Access Study
- Transit Network assignment procedures calibrated to match observed travel patterns

A summary of the ridership forecasting methodology is presented in Chapter 2 of this report.

These ridership forecasting procedures were used to study the following alternatives:

- **Future Year No-Build.** The no-build represents the future condition assuming that the LIRR-to-Grand Central project is not-built. It does include the existing and committed projects that will occur between the model base year (1995) and the forecast years (2010 and 2020). Selected key projects that are assumed to exist in the No-Build include NYCT's Queens Boulevard Connection to the 63rd Street Tunnel, the LIRR Dual-Mode Program, and the LIRR Penn 42 Program.
- **Future Year TSM.** The TSM project was defined as part of the LIRR East Side Access Major Investment Study. It includes LIRR passenger capacity improvements, increased service to Hunterspoint Avenue, and extension of the existing (in-bound only) contra-flow bus lanes on the Long Island Expressway.
- **Future Year LIRR-to-Grand Central Terminal Build.** The build project involves construction of the LIRR East Side Access Project to Grand Central Terminal. In this alternative, 24 trains in the AM Peak Hour are operated to Grand Central. Service to Penn Station is reduced from 42 peak hour trains in the No-Build to 37 trains. This alternative also includes the construction of a new LIRR passenger station at Sunnyside Yard in Queens.

The definition of each alternative is defined in Chapter 3 of this report.

Chapters 4 and 5 present an overview of the results of the ridership forecasting methodology. Chapter 4 presents the results for the different 2010 alternatives and Chapter 5 presents an overview of the different 2020 alternatives.

Chapter 6 presents an assessment of the risks associated with the forecast. This chapter discusses what is how changes to the assumptions affect the forecasted outcomes. It also includes a discussion of how the key results from the model (i.e., LIRR-to-GCT patronage) have been assessed for reasonableness.

The appendix to this report include detailed tables of results including station volumes, station access vehicle trips, station parking demand, and impacts on NYCT services.

2. DEMAND FORECASTING METHODOLOGY

This chapter provides an brief description of the travel demand forecasting methodology used to prepare forecasts for the Long Island Rail Road East Side Access (LIRR ESA) Draft Environmental Impact Statement (DEIS). The methodology is based on a model that was jointly developed for the LIRR ESA DEIS project in conjunction with other on-going regional transit projects, most notably the Metropolitan Transportation Authority (MTA) Lower Manhattan Access Study (LMAS). The resulting model has been designated as the Metropolitan Transportation Authority Regional Transit Forecasting (MTA RTF) Model and will also be used to analyze the ridership implications associated with other ongoing Long-Range Planning Framework projects including:

- MTA Lower Manhattan Access Study
- Port Authority of NY and NJ/MTA/NJ Transit Access to the Region's Core (ARC) Phase 3 (East-of-Hudson)
- Metro-North Railroad (MNR) Penn Station Access Project

A more complete discussion of the methodology appears in *Metropolitan Transportation Authority Regional Transit Forecasting Model Methods Report* dated June 10, 1999. This chapter describes the key elements of the model to assist the reader in interpreting the forecasts that appear later in this document.

2.1 Overview of Demand Forecasting Methodology

The ridership forecasting methodology for the LIRR ESA DEIS is based on the data and models developed as part of the Metropolitan Transportation Authority Long-Range Planning Framework. It represents the synthesis of three different elements of the framework:

- **Long Island Rail Road East Side Access Major Investment Study (LIRR ESA MIS)/Access to the Region's Core (ARC) Model.** The basic design and programming for the MTA RTF Model is based on the model originally developed for the East Side Access Major Investment Study Project and also applied for the Access to the Region's Core Project. Much of the model data relating to suburban conditions is also obtained from this model.

- **New York City Transit Manhattan East Side Alternatives (MESA) Project.** The MTA RTF Model borrows New York City-specific data and procedures from MESA—an ongoing effort to improve subway and other transit services on Manhattan's East Side. In particular, the networks and New York City Transit validation data have been updated to be consistent with the most recent information from the MESA model. Furthermore, information on the sub-county distribution of population and employment in Manhattan for the MTA RTF model have been developed from an updated version of the forecasts originally developed by AKRF for the MESA project.

- **Metropolitan Transportation Authority Long-Range Travel Forecast Study (MTA LRTFS).** Regional population, household, and employment data (outside Manhattan) at a detailed sub-county level have been developed from the MTA LRTFS. This information is used to project changes in the overall demand for travel beyond the model's 1995 base.

The MTA RTF Model is similar in functional design to a conventional four-step demand forecasting model. In the traditional model, the four steps are defined as:

1. **Trip Generation.** Determine the number of total person trips produced in and attracted to each geographic area (zone) in the region.

2. **Trip Distribution.** Link trip productions (the home end of a trip) to trip attractions (the non-home end) to develop a zone-to-zone table of travel. This table projects the total demand (or total market) for travel via all modes between every combination of zones in the region.

3. **Mode Choice.** Determine the mode of travel (e.g., automobile versus transit) and transit sub-modes (e.g., commuter rail, subway, or bus). This sub-model projects the mode (or market) share for each travel mode in the region. This share is determined for each zone-to-zone combination in the region based on the characteristics of each travel mode and the characteristics of the users.

4. **Assignment.** Determine the travel path (e.g., which highways or trains) are used. This is done separately for each submode estimated in mode choice. The choice of path is based on a weighted combination of travel time, out-of-vehicle time, fare, transfers, and congestion.

To better represent the potential demand for transit, the MTA RTF Model bypasses the first two steps of the four-step model and substitutes an alternative survey- and Census-based approach for developing person trip tables. This survey/Census approach has been used for the MTA RTF Model (and for most other transit models in the region) since traditional trip generation/distribution models typically do a relatively poor job of replicating observed zone-to-zone travel demand patterns. Knowledge of actual zone-to-zone travel patterns is particularly important for transit planning since customers are sensitive to the availability of direct transit services with a minimum of transfers. To be able to guide the design of the most effective transit services, models must replicate, as closely as possible, the true origin and destination of travel. Experience in the New York metropolitan area has shown that survey- and Census-derived trip tables are most effective for representing these travel patterns.

The utilization of survey/Census-derived person trip tables rather than trip generation and distribution models means that an alternative approach is required for developing projections of total travel demand for the forecast years. In the MTA RTF Model, the forecast year person trip tables are developed by factoring (or "growing") the base year person trip table based on the relative growth in population, households, employment, and journey-to-work travel in each portion of the metropolitan area.

2.2 Travel Markets

The MTA RTF Model represents most regional travel in the New York Metropolitan area and, in particular, is designed to estimate trips for the following markets:

1. LIRR and MNR Commuters to Manhattan

2. NYCT Subway and Bus customers, particularly those attracted to destinations in Manhattan

3. Automobile travelers from the New York and Connecticut portions of the region to Manhattan who currently choose not to use the transit because the locations of the city terminals (Grand Central, Penn Station, Hunterspoint, Long Island City, or Flatbush Avenue) are not convenient to the traveler's trip origin or destination or because the connections to their destination are inconvenient.

4. Transit customers from New Jersey to Manhattan

The major trip purposes to be considered include:

- Home-based work
- Home-based other
- Non-home-based

The data and procedures used to develop these projections do not include:

1. Air travelers with a place residence outside of the New York portion of the New York metropolitan area.
2. Automobile travelers to or from New Jersey.
3. Trips or travel that is made entirely by non-motorized forms of transportation or entirely by taxi.

Because air travelers may have some impact on the regional commuter rail system particularly after the construction of the JFK LRS system connecting Kennedy Airport to the LIRR at Jamaica, and because forecasts are now being prepared for this system as part of the ongoing MTA One-Seat Ride project, these passengers will be manually assigned to the LIRR system as a post-model activity.

2.3 Geographic Area System

The geographic area system for the MTA RTF Model consists of the entire MTA service area and includes all of the following counties:

- **New York State**
  - New York (Manhattan)
  - Bronx
  - Kings (Brooklyn)
  - Queens
  - Richmond (Staten Island)
  - Nassau
  - Suffolk
  - Westchester
  - Putnam
  - Dutchess
  - Rockland
  - Orange
- **Connecticut**
  - Fairfield
  - New Haven
  - Litchfield

Geographic subdivisions are as follows:

- MESA zones (tracts and selected sub-tract subdivisions) in Manhattan
- Census Tracts in Nassau, Suffolk, and Fairfield Counties

- Aggregated Census Tracts mostly based on NYMTC Traffic Analysis Zones in Bronx, Brooklyn, Queens, and Westchester Counties
- Port Authority of NY and NJ/NJ Transit zones in Richmond, Orange, and Rockland Counties
- Minor Civil Divisions in Putnam and Dutchess Counties
- Counties for New Haven and Litchfield Counties

2.4 Highway Networks

The regional highway system is characterized using a network representation of all expressways, parkways, and arterial roadways in the geographic area described above. Highway networks representing peak congested conditions in 1990, 1996, 2015, and 2020 were obtained from the Interim Analysis Methods model developed by Parsons Brinckerhoff for the New York Metropolitan Transportation Council.

Congested speeds for that network are a combination of:

- PPAQ (Post Processor for Air Quality) estimated travel speeds (expressway and arterial links) and
- TRANPLAN congested speeds (for all other links).

Since PPAQ speeds were available for 1990 and 2015 only, 1990 speeds were posted to the 1996 network and 2015 speeds were posted to the 2020 network. Given that relatively few changes to the highway system have occurred between 1995 and 1996, the 1996 NYMTC network is assumed to be representative of 1995 conditions for purposes of estimating 1995 transit travel demand.

2.5 Year 1995 Transit Networks

The transit networks for the MTA RTF Model are derived from two basic sources:

- The TRANSCAD 2.1 transit network prepared by MTA and URS Greiner for the MTA Long Range Travel Forecast Study (LRTFS).
- The TRANSCAD 2.1 networks developed by New York City Transit for the MESA project with updated and refined representations of NYCT transit services, Manhattan sidewalk links, and NYCT access, egress, and transfer links.

Key elements of the MTA RTF Networks are described in the following subsections.

2.5.1 Network Scope

The MTA RTF Model transit networks include representations of most AM Peak Hour services in the New York metropolitan area (east of the Hudson River) and all of the existing (Year 1995) transit service relevant to the on-going LRPF projects. Coded services were obtained from the MTA LRTFS and NYCT MESA networks and include:

- All AM Peak Hours Long Island Rail Road (LIRR) and Metro-North Railroad (MNR) services (shown in Figure 2-1)
- AM Peak Hour NYCT Subway and PATH routes (shown in Figure 2-2)
- AM Peak Hour Staten Island Ferry (dashed line in Figure 2-2) and New Jersey ferry services

- AM Peak Hour NYCT, MSBA/LI Bus, and other regional bus services (shown in Figure 2-3)

2.5.2 Zonal Access and Egress Links

Zonal access (and egress) links are used to describe the means by which travelers can access the regional transit system either on foot or by car. In the MTA RTF model, these links are based on the access and egress links originally coded in the MTA LRTFS and NYCT MESA transit networks and converted to the Geographic System used in the MTA RTF Model. Access and egress links to commuter rail stations were manually recoded as part of the MTA RTF development to better represent expected station capture areas.

The distance on each link is computed based on the straight-line distance between the zone centroid and the transit node. An assumed speed of 1.6 mph was used to compute the travel time over all walk links. To account for situations where access to transit is predominantly made by automobile, travel times on links serving park-and-ride stations were adjusted to represent realistic automobile travel times as shown in Table 2-1.

Table 2-1 Drive Connect Speed Assumptions

(Applied to Centroid-to-PNR Connectors)

County	State	Assumed Speed (mph)
New York	NY	15
Kings	NY	15
Queens	NY	15
Nassau	NY	25
Suffolk	NY	35
Bronx	NY	15
Westchester	NY	25
Putnam	NY	35
Dutchess	NY	45
Fairfield	CT	35
Richmond	NY	15
Rockland	NY	35
Orange	NY	35
Litchfield	CT	35
New Haven	CT	35

Source: Parsons Brinckerhoff, LIRR Network Strategy Study

Figure 2-1 Commuter Rail Network

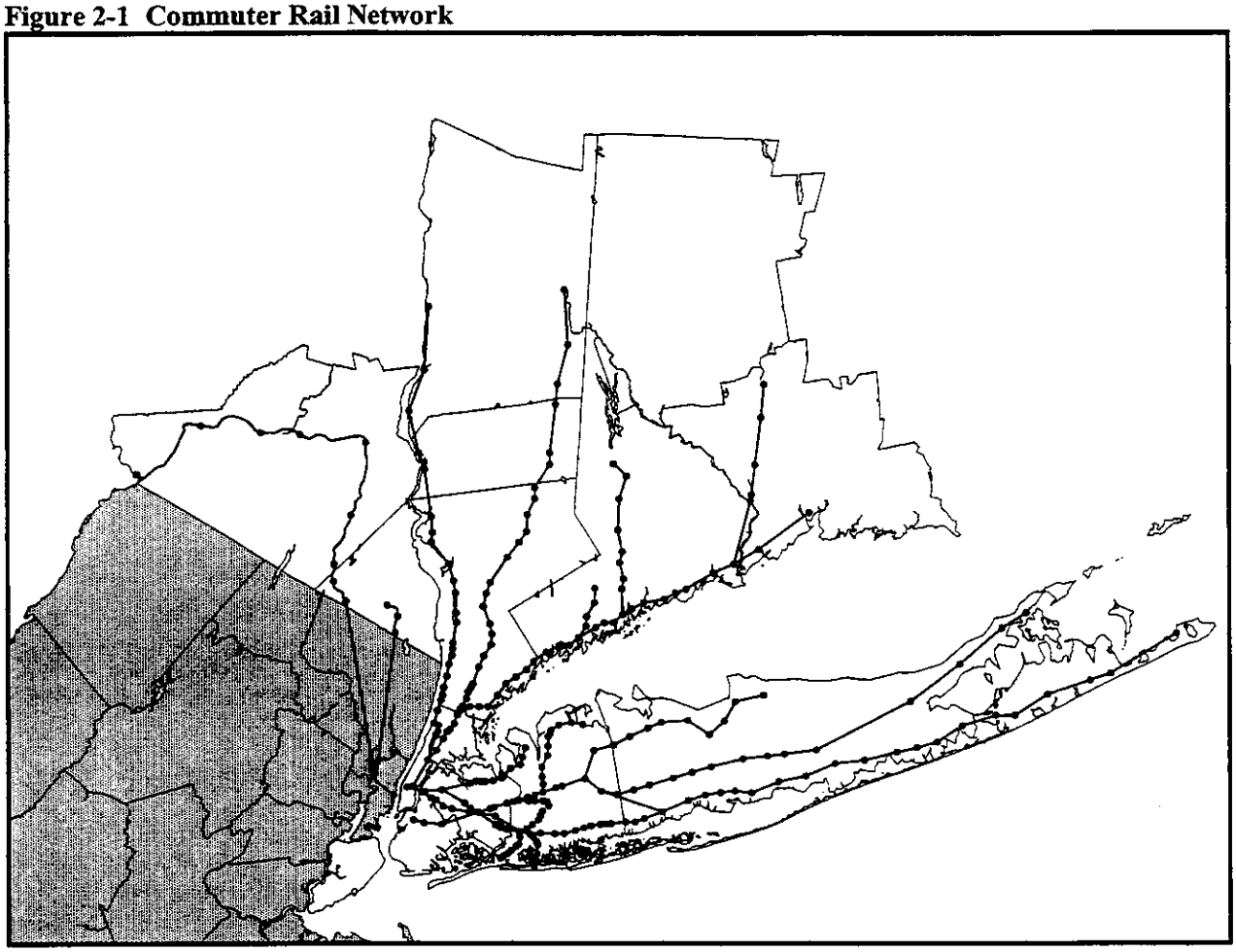


Figure 2-2 Subway, PATH and Ferry Network

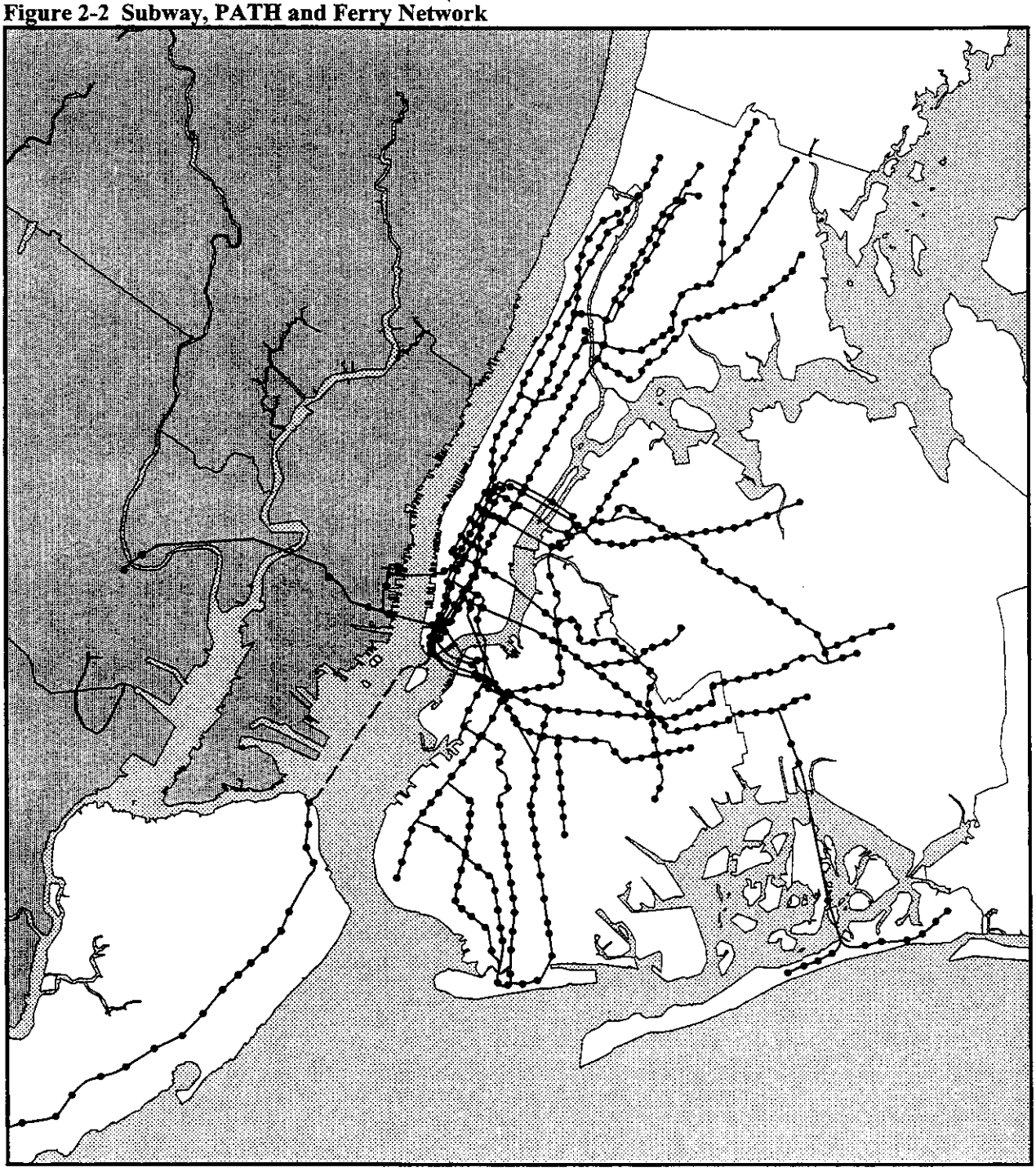
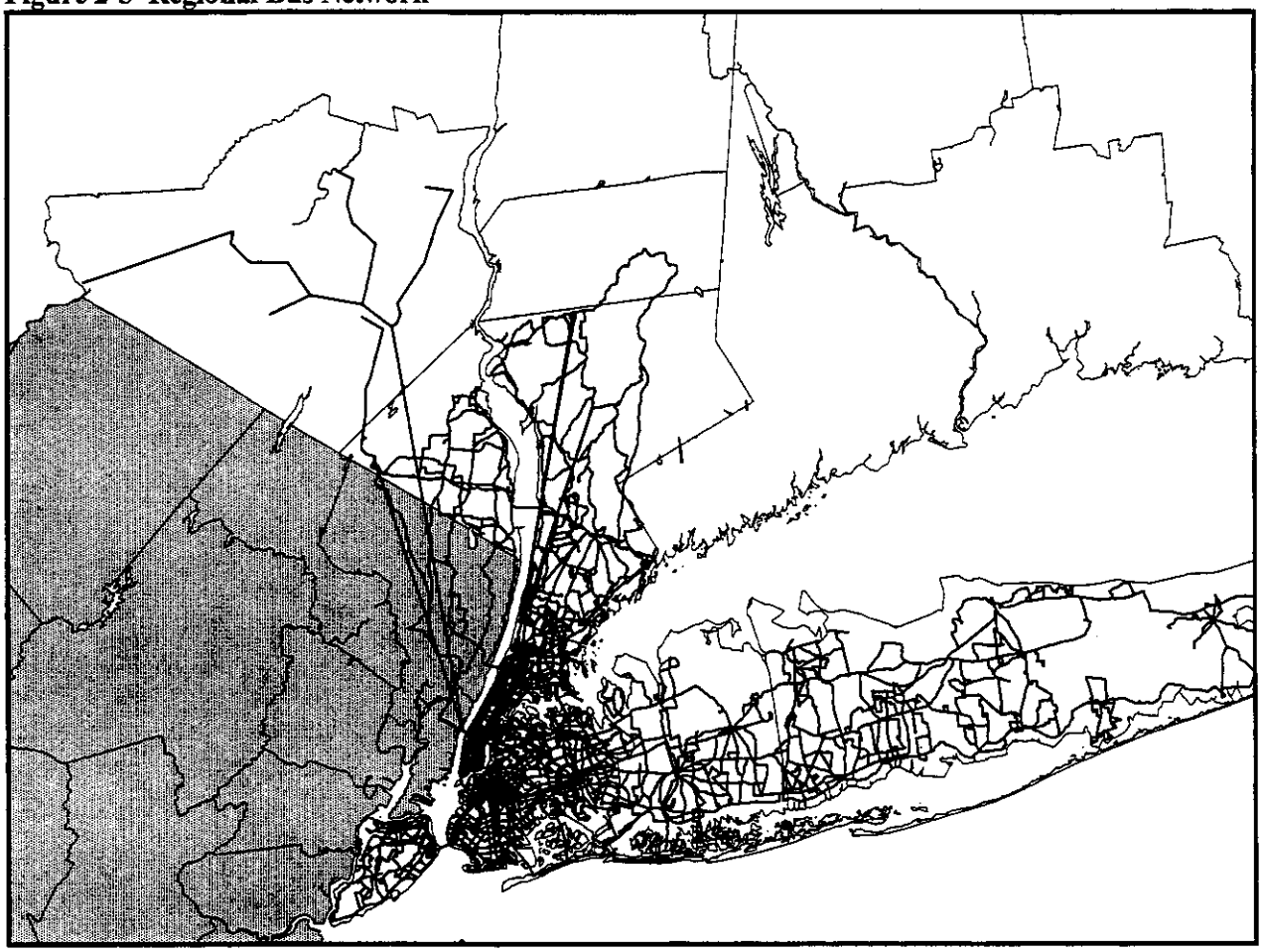


Figure 2-3 Regional Bus Network



2.5.3 In-Vehicle Times

Transit in-vehicle times are based on the coded values provided by MTA for each route. In cases where one route represents several trains, the coded time represents the average for all trains. In-vehicle travel times for LIRR and MNR services were compared to scheduled times as discussed later in this section and adjusted as necessary to assure that the network representation of running time matches the scheduled times.

2.5.4 Out-of-Vehicle Travel Times

With the exception of drive-to-transit centroid connectors and subway-to-subway transfer links, out-of-vehicle times are based on the distance coded on the link and an assumed travel speed of 1.6 miles per hour. Drive-to-transit speeds are described in Section 2.5.2 and subway-to-subway transfer times are based on platform-to-platform walking times collected by NYCT.

2.5.5 Waiting Times

With the exception of commuter rail services, waiting times are set equal to the "combined waiting time" field which represents the combined effect of all routes or services on the line. This field was calculated by the MTA/NYCT by analyzing all routes that connect each node to the Manhattan CBD, counting the number of trains/buses per hour providing that service, dividing total trains/buses into 60 minutes to determine the combined headway, and dividing by 2 to determine the average waiting time.

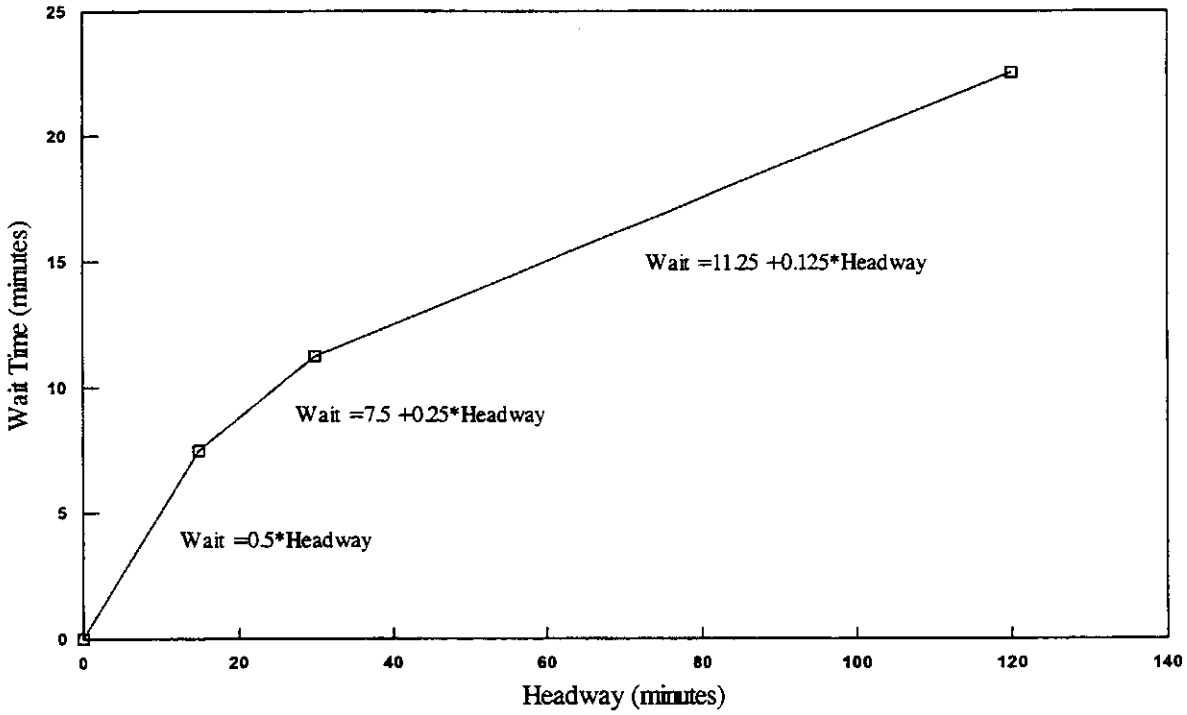
LIRR waiting times were computed using an automated procedure that calculates the number of trains connecting each LIRR station to each of the five existing or proposed terminal stations: New York Penn Station, Grand Central Terminal, Hunterspoint Avenue, Long Island City, and Flatbush Avenue. The combined headway is computed separately for each origin station/terminal station/direction (inbound/outbound) as 60 minutes divided by the total number of trains in the peak hour. The average waiting time is computed from the combined headway based on the relationship developed by Parsons Brinckerhoff for the LIRR Network Strategy Study and shown in Figure 2-4.

A similar procedure is applied for each MNR station using the combined frequency of trains traveling to either Grand Central Terminal or a new MNR Terminal in Manhattan.

2.5.6 Manhattan Sidewalk Network

A sidewalk network is provided in the Manhattan CBD and portions of Brooklyn to provide walk access between each zone and all transit facilities in the region. Out-of-vehicle travel time on all sidewalk links is computed assuming an average speed of 1.6 miles per hour.

Figure 2-4 Computation of Waiting Time for Commuter Rail Services



Source: Parsons Brinckerhoff, LIRR Network Strategy Study

2.5.7 Year 1995 Fare Coding

Fares are based on the coding approach established by MTA to represent Year 1995 (before the November 12 fare increase) tariffs and are expressed in 1995 cents. The procedures used for coding fares are different for each mode and are described below.

- **Commuter Rail.** Fares are computed by coding a fare value on all station access links, station egress links, and on links where trains cross one or more fare zone boundaries. The commuter rail fare is the sum of all three components. The coded fares for 1995 are displayed in Tables 2-2, 2-3, and 2-4.

Table 2-2 LIRR 1995 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to Zone 1
14	63	62	62	622
12	50	62	62	559
11	36	62	62	509
10	45	62	62	473
9	49	62	62	428
7	47	56	56	373
4	90	56	56	326
3	55	101	101	281
1	N/A	125	125	250

Note: Fares effective for 1995 before 11/12/95 and represent a weighted average of the cost of different fare media.

Table 2-3 Metro-North Hudson/Harlem Line 1995 Fare Calculation (in Year 1995 Cents)

Hudson Fare Zone	Harlem Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Poughkeepsie	Dover Plains-Harlem Vy	55	36	36	607
New Hamburg-Beacon	Appl. Trail-Patterson	57	36	36	552
Breakneck Ridge-Manitou	Brewster North-Purdy's	43	36	36	495
Crugers-Peekskill	Golden's Br-Mt Kisco	60	36	36	452
Tarrytown-Croton Harmon	Chappaqua-Valhalla	55	36	36	392
Hastings-Irvington	N White Plains-Scarsdale	36	36	36	337
Ludlow-Graystone	Crestwood-Mt Vernon W	32	36	36	301
Morris Heights-Riverdale	Wakefield-Melrose	120	25	25	258
125th Street	125th Street	0	113	113	226
Grand Central Terminal	Grand Central Terminal	N/A	113	113	N/A

Note: Coded fares represent a weighted average of the cost of different fare media.

Table 2-4 Metro-North New Have Line 1995 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Derby Shelton-Waterbury (branch at Bridgprt)	68	35	35	704
Branchville-Danbury	68	35	35	611
Merrit 7-Cannondale (branch at S Norwalk)	3	35	35	543
Glenbrook-New Caanan (branch at Stamford)	0	35	35	504
New Haven	86	35	35	722
Bridgeport-Milford	60	35	35	636
Westport-Fairfield	36	35	35	576
South Norwalk-East Norwalk	36	35	35	540
Noroton Heights-Rowayton	0	35	35	504
Stamford	52	35	35	504
Greenwich-Old Greenwich	67	35	35	452
Rye-Port Chester	28	15	15	365
Larchmont-Harrison	37	15	15	337
Mount Vernon-New Rochelle	52	15	15	300
Fordham	120	25	25	258
125th Street	0	113	113	226
Grand Central Terminal	n/a	113	113	N/A

Note: Coded fares represent a weighted average of the cost of different fare media.

- **NYCT Subway.** Fares are computed by coding a $1.50 fare on all subway station access links (zone connectors and intermodal transfer links-to/from-subway station). No fare is charged on station egress links. Likewise, no charge is assessed for 3rd Avenue (Bronx) buses with a free transfer in 1995 to the 3rd Avenue-149th Street subway station.

- **Bus.** Fares are computed as a combination of boarding and fare zone charges. For NYCT buses, a flat $1.50 charge is coded on bus access links and on transfers from subway-to-bus. MTA-provided fares were used for all other bus operators.

2.5.8 Commuter Rail Service Coding Review

Coded LIRR and MNR commuter rail services were compared to published 1995 schedules to confirm the appropriateness of the network for evaluating the alternative projects for each railroad. This comparison is presented in Table 2-5 (LIRR) and 2-6 (MNR) and indicates that the networks properly represent each carrier's passenger services.

Table 2-5 Comparison of Coded and Scheduled Base Year AM Peak Hour LIRR Services

Branch	Service	Scheduled			Coded		
		Train #	Trains/ Hour	Running time	Route #	Trains/Hr	Running Time
Port Washington	Port Wash-Great Neck Express to NYPS	419,421,425, 427	3-4	34-41	501	3-4	36.7
	Port Wash-Manhasset Local to NYPS	423	1	47	502	1	47.5
	Great Neck/Little Neck-Bayside Express to NYPS	303,305	1-2	33	503	1-2	33.5
	Great Neck Local to NYPS	307	1	34	504	1	33.5
Port Jefferson	Port Jeff-Syosset Express to Hunterspoint	609	1	106	505	1	106
	Port Jeff-Huntington Express to Jamaica/Hunterspoint	607,611	1-2	107-109	506	1-2	107
	Hicksville Local to Jamaica/NYPS	1209,1213	1-2	44-48	507	1-2	47
	Hicksville-Carle Place Express to NYPS	1211	1	47	508	1	47
	Huntington-Syosset Express to NYPS	1619,1623	2	54-57	509	2	55.5
	Huntington Local to Jamaica/Flatbush	1621	1	60	510	1	59.5
Ronkonkoma	Greenport-Hicksville Express to NYPS	201/2017	1	159	511	1	159
	Ronkonkoma-Brentwood Express to NYPS	2019	1	63	512	1	63
	Ronkonkoma-Bethpage Express to Jamaica/NYPS	2021	1	75	513	1	78
	Ronkonkoma Local to Jamaica and Flatbush	2099	1	76	514	1	75.5
Oyster Bay	Oyster Bay Local to Jamaica/Long Island City	507	1	n/a	515	1	89.5
	Oyster Bay Local to Jamaica/Hunterspoint	509	1	80	516	1	80
	E Williston Local to Jamaica/NYPS	1501	1	45	517	1	46
Hempstead	Hempstead Local to Jamaica/Flatbush	719,721	1-2	50-54	518	1-2	52
	Hempstead Local to Jamaica/NYPS	717,723	1-2	46-47	519	2	47
West Hempstead	West Hempstead Local to Jamaica/Flatbush	905	1	46	520	1	44.5
	West Hempstead Local to Jamaica/NYPS	907	1	51	521	1	50
Far Rockaway	Far Rockaway Local to Jamaica/Flatbush	3011,3013	1-2	48-57	522	1-2	50
	Far Rockaway Local to Jamaica/NYPS	3203,3013	1-2	53-56	523	1-2	57
	Valley Stream Local to Jamaica/NYPS	1901	1	37	524	1	45
Long Beach	Long Beach-Valley Stream-Laurelton Express to NYPS	815	1	52	525	1	52
	Long Beach--Lynbrook Express to NYPS (schedule shows additional stop at Valley Stream)	817	1	52	526	1	47
	Long Beach Local to Jamaica/NYPS	819	1	50	527	1	52
	Long Beach Local to Jamaica/Flatbush	820	1	48	528	1	47.5
Babylon	Babylon-Rockville Center Local to Jamaica/Flatbush	1011,107, 1017, 113	2	69-73	529	2	68.5
	Babylon-Baldwin to Jamaica/NYPS	109,111	1	72	530	1	73
	Babylon-Baldwin Express to NYPS	1013,1199, 1015,1099, 1019,115, 1105,117	2-3	70	531	2-3	65.5
Babylon thru Montauk	Patchogue to Jamaica/Long Island City	41	1	N/A	532	1	109.5
	Montauk-Sayville Express to Jamaica/Hunterspoint	13	1	182	533	1	181
	Speonk to Jamaica/NYPS	11/111	1	132	534	1	132

Table 2-6 Comparison of Coded and Scheduled Base Year AM Peak Hour MNR Services

Branch	Service	Scheduled			Coded		
		Train #	Trains/Hr	Running time	Route #	Trains/Hr	Running Time
Pascack Valley	Spring Valley/Pearl River to Hoboken	1604,1606, 1608,1610	4	59-65	206	4	59.00
Port Jervis	Port Jervis/Suffern to Hoboken	52,54	2	135-134	207	2	134.50
New Haven	Waterbury Local to Bridgeport	1933	1	54	205	1	54.00
	New Haven/East Norwalk to GCT	1427-1529	1-2	95	551	1-2	95.50
	New Canaan/Stamford to GCT	1723	1	69	552	1	69.00
	New Canaan/Glenbrook to GCT	1731	1	67	553	1	67.00
	Harrison Local to GCT	1319,1327,1231	3	40-41	554	3	40.50
	Stamford Local to GCT	1217,1321, 1225,1229	1-4	74	555	1-4	74.00
	New Haven/Harrison to GCT	1323,1325, 1331,1629	1-3	118	556	1-3	116.50
	New Haven/Stamford to GCT	1521,1533	1-2	107	557	1-2	104.50
	Danbury/Stamford to GCT	1429,1833	1-2	119	558	1-2	120.00
	Danbury/South Norwalk to GCT	1819	1	108	559	1	108.00
Harlem	Fleetwood Local to GCT	316,324,328	1-3	33-38	561	1-3	34.50
	Scarsdale Local to GCT	518,524,632	1-3	53	562	1-3	53.00
	Hartsdale/Scarsdale to GCT	520,526,532	3	38-39	563	3	38.50
	Dover Plains/White Plains to GCT	922,3928,528, 928	1-4	113-126	564	1-4	122.00
	Brewster North/White Plains to GCT	918,924,930	2-3	78-90	565	2-3	80.50
Hudson	Croton-Harmon/Marble Hill to GCT	420,730,430	1-3	69	571	1-3	74.00
	Croton-Harmon/Morris Heights to GCT	722	1	70	572	1	68.00
	Croton-Harmon/Tarrytown Express to GCT	718,720,726, 728,736	1-4	51	573	2-4	50.00
	Irvington/Greystone to GCT	724,734	1-2	44	574	1-2	43.50
	Poughkeepsie/Croton-Harmon to GCT	730,836	2	106	575	2	106.00
	Poughkeepsie/Beacon Express to GCT	832	1	90	576	1	90.00

2.6 Year 2010 and 2020 No-Build Transit Networks

2.6.1 Year 2010 and 2020 Physical and Service Characteristics

The 2010 and 2020 no-build transit networks are identical and are based on the MTA and NYCT MESA 2020 AM Peak Hour no-build networks. These networks are generally similar to the 1995 AM Peak Hour base network and incorporate the following committed system improvements:

1. Bus service modifications to represent expected future year operations
2. NYCT coding of the Year 2020 No-Build Subway Network. The 2020 Network includes completion of the 63rd Street tunnel and revision of operating plans to utilize this facility
3. Improvements to the LIRR increasing the train capacity into Penn Station from 36 trains in the peak hour to 42 trains per hour
4. LIRR service given acquisition of dual-mode locomotives. This equipment will enable operation of six peak-hour trains from non-electrified branches direct to New York Penn Station
5. Minor changes to MNR operations and the extension of the Harlem Line to Wassaic
6. Free Bus-Subway Transfers
7. Secaucus Transfer in New Jersey which will enable a direct transfer from the MNR Port Jervis and Spring Valley Lines to NJ Transit Northeast Corridor service to Penn Station

2.6.2 Year 2010 and 2020 Fare Coding

Year 2010 and 2020 fares are identical and are based on the representation of MTA fare policies included in the 2020 LRPF network. These policies are based on the assumption that all non-commuter rail fares rise at the rate of inflation. Commuter rail fares in New York are assumed constant between November 1995 and December 1999 at which time they rise at the same rate as inflation. Coding for each mode is as described below.

- **Commuter Rail.** The coded fares were developed from the MTA Long Range Planning Framework Year 2020 fares and adjusted to convert from 1990 dollars (used in the LRPF network) to 1995 dollars (used in the MTA RTF Networks). The resulting boarding, alighting, and zone fares are generally represent a small decrease in fares (in constant dollars) between 1995 and 2020 in New York. Fares from Connecticut rise slightly between 1995 and 2020. Year 2020 Commuter rail fare parameters are as follows:

Table 2-7 LIRR 2020 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to Zone 1
14	62	61	61	603
12	49	61	61	541
11	35	61	61	492
10	43	61	61	457
9	48	61	61	414
7	45	54	54	359
4	86	54	54	314
3	53	97	97	271
1	N/A	121	121	242

Table 2-8 Metro-North Hudson Harlem Line 2020 Fare Calculation (in Year 1995 Cents)

Hudson Fare Zone	Harlem Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Poughkeepsie	Dover Plains-Harlem Vy	55	36	36	594
New Hamburg-Beacon	Appl. Trail-Patterson	56	36	36	539
Breakneck Ridge-Manitou	Brewster North-Purdy's	42	36	36	483
Crugers-Peekskill	Golden's Br-Mt Kisco	60	36	36	441
Tarrytown-Croton Harmon	Chappaqua-Valhalla	53	35	35	380
Hastings-Irvington	N White Plains-Scarsdale	34	35	35	327
Ludlow-Graystone	Crestwood-Mt Vernon W	31	35	35	293
Morris Heights-Riverdale	Wakefield-Melrose	116	24	24	251
125th Street	125th Street	0	111	111	222
Grand Central Terminal	Grand Central Terminal	n/a	111	111	N/A

Table 2-9 Metro-North New Have Line 2020 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Derby Shelton-Waterbury (branch at Bridgprt)	78	40	40	745
Branchville-Danbury	67	40	40	627
Merrit 7-Cannondale (branch at S Norwalk)	3	40	40	560
Glenbrook-New Caanan (branch at Stamford)	0	40	40	516
New Haven	99	40	40	766
Bridgeport-Milford	69	40	40	667
Westport-Fairfield	41	40	40	598
South Norwalk-East Norwalk	41	40	40	557
Noroton Heights-Rowayton	0	40	40	516
Stamford	60	40	40	516
Greenwich-Old Greenwich	77	40	40	456
Rye-Port Chester	27	15	15	354
Larchmont-Harrison	35	15	15	327
Mount Vernon-New Rochelle	50	15	15	292
Fordham	116	24	24	251
125th Street	0	111	111	222
Grand Central Terminal	N/A	111	111	N/A

Note: Equivalent to monthly pass cost/38 trips per month.

- **NYCT Subway.** Year 2020 Fares are computed by coding a $1.50 fare (1995 dollars) on all subway station access links (zone connectors and intermodal transfer links-to/from-subway station). No fare is charged on station egress links. To represent the Metro Card free bus-to-subway transfer, no fare is charged on bus-to-subway transfer links.

- **Bus.** Fares are computed as a combination of boarding and fare zone charges. For NYCT buses, a flat $1.50 fare is charged on boarding. No fare is charged on subway-to-bus transfers or bus-to-bus.

2.7 Socioeconomic Projections

Projections of population and employment are a fundamental element of the travel forecasting process and are used for "growing" or "factoring" 1995 travel patterns to represent expected Year 2020 travel.

Socioeconomic projections are based on NYMTC and MTA adopted forecasts and comprise three types of information:

1. NYMTC forecasts of county-level attributes such as population, labor force, and employment

2. NYMTC forecasts of county-to-county journey-to-work flows

3. MTA forecasts of sub-county population and employment

Each element is discussed below.

2.7.1 NYMTC County-Level Forecasts of Population, Labor Force and Employment

Forecasts of county-level population, labor force and employment are both directly used in the MTA RTF Model procedures and are also used in the development of the underlying NYMTC county-to-county journey-to-work flows and MTA subcounty forecasts of population and employment. This section does not document the methodology used to develop these forecasts (available from NYMTC and MTA) but instead documents results of these forecasting methodologies.

Projected population by county between 1970 and 2020 (in 5-year increments after 1990) is presented in Table 2-10. As shown in this table, population in the region is expected to grow from 20.2 million in 1995 to 22.8 million in 2020, an increase of 13.2 percent. Population in New York City, Long Island, and Mid-Hudson is expected to grow by 8.1 percent, 16.7 percent, and 14.4 percent, respectively between 1995 and 2020.

Projected labor force by county represents a key input to the journey-to-work projections and is shown in Table 2-11. As shown in this table, labor force in the region is expected to grow from 10.4 million in 1995 to 12.8 million in 2020, an increase of 22.4 percent. The fact that the percentage growth in labor force is 70 percent higher than the growth rate for population suggests that the labor force participation rates are expected to continue to grow between 1995 and 2020. The labor force residing in New York City, Long Island, and Mid-Hudson is expected to grow by 13.8 percent, 29.5 percent, and 25.4 percent, respectively between 1995 and 2020.

Projected total employment by county is presented in Table 2-12. As shown in this table, total employment in the region is expected to grow from 10.5 million in 1995 to 13.0 million in 2020, an increase of 23.8 percent. Total regional employment is very similar in magnitude to the projected total labor force. The distribution among counties, however, is different and represents the difference between place of residence and place of employment for all workers. Total employment in Manhattan (New York County) is expected to grow from 2.3 million in 1990 to 2.7 million in 2020, an increase of 18.6 percent. Employment in all of New York City, Long Island, and Mid-Hudson is expected to grow by 18.2 percent, 30.1 percent, and 27.4 percent, respectively between 1995 and 2020.

Payroll employment represents those employees recorded on the payroll of a company and excludes sole proprietors. Projected payroll employment by county is presented in Table 2-13. As shown in this table, payroll employment in the region is expected to grow from 8.9 million in 1990 to 10.7 million in 2020, an increase of 20.7 percent. The fact that payroll employment is expected to grow less rapidly than total employment represents expectations that an increasing share of all employment will be sole proprietor employment. Payroll employment in Manhattan (New York County) is expected to grow from 2.1 million in 1990 to 2.4 million in 2020, an increase of 14.4 percent.

Table 2-10 Population Projections by County

(Population in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	1,471.7	1,169.0	1,203.8	1,192.6	1,203.8	1,223.4	1,240.3	1,260.0	1,289.8
Kings	2,602.0	2,231.0	2,300.7	2,275.7	2,285.5	2,300.8	2,333.7	2,370.0	2,412.4
New York	1,539.2	1,428.3	1,487.5	1,510.0	1,520.4	1,540.8	1,556.7	1,565.2	1,575.0
Queens	1,986.5	1,891.3	1,951.6	1,970.3	1,999.0	2,029.4	2,062.4	2,124.0	2,189.2
Richmond	295.4	352.0	379.0	400.0	413.7	428.4	441.5	455.0	475.0
NEW YORK CITY	7,894.8	7,071.6	7,322.6	7,348.6	7,422.4	7,522.8	7,634.6	7,774.2	7,941.4
Nassau	1,428.1	1,321.6	1,287.3	1,302.3	1,318.8	1,329.6	1,349.8	1,379.9	1,433.6
Suffolk	1,125.0	1,284.2	1,321.9	1,347.1	1,367.3	1,423.3	1,495.2	1,571.0	1,658.1
LONG ISLAND	2,553.1	2,605.8	2,609.2	2,649.4	2,686.1	2,752.9	2,845.0	2,950.9	3,091.7
Dutchess	222.3	245.1	259.5	259.8	263.6	278.4	289.9	301.1	315.6
Orange	221.7	259.6	307.6	319.5	336.9	361.5	384.7	407.1	431.5
Putnam	56.7	77.2	83.9	89.2	91.8	95.2	98.8	102.3	106.3
Rockland	229.9	259.5	265.5	274.8	280.0	286.9	295.5	305.3	315.0
Sullivan	52.6	65.2	69.3	70.0	71.0	74.9	79.0	83.2	87.7
Ulster	141.2	158.2	165.3	165.9	169.2	173.1	177.1	186.6	200.1
Westchester	894.1	866.6	874.9	885.6	891.0	892.9	897.7	900.0	905.0
MID-HUDSON	1,818.5	1,931.4	2,026.0	2,064.8	2,103.5	2,162.9	2,222.7	2,285.6	2,361.2
NY SUBURBS	4,371.6	4,537.2	4,635.2	4,714.2	4,789.6	4,915.8	5,067.7	5,236.5	5,452.9
NY METRO	12,266.4	11,608.8	11,957.8	12,062.8	12,212.0	12,438.6	12,702.3	13,010.7	13,394.3
Bergen	898.0	845.4	825.4	846.9	847.6	851.2	857.3	858.9	859.2
Essex	930.0	851.3	778.2	770.1	777.8	782.2	782.4	779.9	779.7
Hudson	609.3	557.0	553.1	556.0	567.9	588.1	612.5	638.4	652.1
Hunterdon	69.7	87.4	107.8	117.9	127.3	136.8	146.4	156.0	165.6
Mercer	304.0	307.9	325.8	330.8	343.5	361.3	383.1	400.4	411.7
Middlesex	583.8	595.9	671.8	701.5	729.6	763.9	797.5	838.8	889.6
Monmouth	459.4	503.2	553.1	586.6	601.6	633.1	656.6	680.1	703.6
Morris	383.5	407.6	421.4	445.5	460.4	460.4	460.5	465.2	475.2
Ocean	208.5	346.0	433.2	466.5	508.5	559.9	606.9	653.9	703.5
Passaic	460.8	447.6	453.1	463.8	463.6	463.5	463.4	463.3	463.2
Somerset	198.4	203.1	240.3	267.7	288.7	292.0	312.3	348.6	371.1
Sussex	77.5	116.1	130.9	140.6	149.7	157.6	167.2	178.1	185.2
Union	543.1	504.1	493.8	499.0	502.0	502.5	503.8	515.5	523.1
Warren	73.9	84.4	91.6	96.7	106.3	115.0	122.9	131.2	140.8
NEW JERSEY	5,799.9	5,857.0	6,079.5	6,289.6	6,474.5	6,667.5	6,872.8	7,108.3	7,323.6
Fairfield	792.8	807.1	827.6	838.4	846.6	877.8	906.3	945.5	978.1
Litchfield	144.1	156.8	174.1	181.0	190.6	200.4	211.6	223.2	241.0
New Haven	744.9	761.3	804.2	807.6	823.3	839.2	857.5	876.3	903.7
CONNECTICUT	1,681.8	1,725.2	1,805.9	1,827.0	1,860.5	1,917.4	1,975.4	2,045.0	2,122.8
REGION	19,748.1	19,191.0	19,843.2	20,179.4	20,547.0	21,023.5	21,550.5	22,164.0	22,840.7

Source: Urbanomics (9/18/95)

Table 2-11 Labor Force Projections by County

(Labor Force in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	552.4	443.9	501.7	483.5	476.1	471.9	500.7	521.4	554.6
Kings	1,012.4	902.3	1,036.0	1,009.3	991.4	1,028.0	1,065.9	1,101.5	1,139.4
New York	741.7	754.1	837.2	833.2	817.2	858.3	882.2	911.1	910.2
Queens	908.9	907.4	1,015.7	1,010.1	1,001.9	1,049.8	1,082.9	1,115.1	1,169.6
Richmond	115.3	153.6	189.2	193.4	195.6	212.8	227.8	232.5	242.0
NEW YORK CITY	3,330.7	3,161.3	3,579.8	3,529.5	3,482.2	3,620.8	3,759.5	3,881.6	4,015.8
Nassau	585.5	654.8	690.1	719.1	741.3	766.2	795.1	822.2	851.1
Suffolk	403.2	573.8	698.7	700.0	721.8	770.4	838.9	909.8	986.7
LONG ISLAND	988.7	1,228.6	1,388.8	1,419.1	1,463.1	1,536.6	1,634.0	1,732.0	1,837.8
Dutchess	84.9	112.2	133.5	131.2	134.4	137.6	145.1	153.0	165.9
Orange	83.0	111.5	150.0	171.4	188.9	212.4	226.8	242.4	253.7
Putnam	20.7	35.9	46.9	51.0	52.9	55.7	59.3	62.3	65.6
Rockland	86.6	125.0	141.4	149.6	156.8	165.0	174.2	181.8	185.2
Sullivan	21.1	27.3	31.8	37.5	36.8	39.5	42.7	45.7	48.8
Ulster	54.8	72.4	84.4	86.2	88.7	97.0	101.7	109.0	118.3
Westchester	383.1	433.7	468.4	447.6	449.5	456.1	476.3	489.4	510.3
MID-HUDSON	734.2	918.0	1,056.4	1,074.5	1,108.0	1,163.3	1,226.1	1,283.6	1,347.8
NY SUBURBS	1,722.9	2,146.6	2,445.2	2,493.6	2,571.1	2,699.9	2,860.1	3,015.6	3,185.6
NY METRO	5,053.6	5,307.9	6,025.0	6,023.1	6,053.3	6,320.7	6,619.6	6,897.2	7,201.4
Bergen	397.9	442.2	456.7	463.9	479.3	505.1	516.8	517.1	510.6
Essex	392.0	391.6	399.9	407.6	428.9	450.2	469.8	476.3	489.6
Hudson	267.3	262.8	294.8	315.2	321.8	338.2	360.7	382.9	388.3
Hunterdon	28.3	42.6	60.1	65.3	73.2	79.7	88.1	96.1	99.9
Mercer	132.1	151.6	175.5	163.9	172.3	180.6	193.7	208.2	219.7
Middlesex	247.4	307.6	379.6	404.6	440.8	469.5	506.3	532.4	567.5
Monmouth	169.8	230.4	290.2	302.4	319.3	345.6	368.9	395.0	407.5
Morris	157.1	209.0	243.1	235.3	256.9	263.1	269.7	280.2	288.4
Ocean	69.1	131.7	192.8	223.6	223.0	247.1	266.6	295.7	323.8
Passaic	201.1	215.0	242.9	257.9	263.3	267.2	277.7	289.3	290.7
Somerset	83.4	106.5	141.5	150.1	160.0	165.6	176.2	199.7	214.6
Sussex	30.3	54.8	70.5	81.3	86.1	89.1	96.8	105.1	107.0
Union	242.3	256.9	268.6	290.5	304.1	306.9	315.1	324.1	322.0
Warren	30.2	39.4	47.9	55.3	58.0	63.8	69.4	75.1	79.7
NEW JERSEY	2,448.3	2,842.1	3,264.1	3,416.9	3,587.0	3,771.7	3,975.8	4,177.2	4,309.3
Fairfield	340.1	404.7	455.0	457.8	462.5	494.8	526.8	561.7	573.3
Litchfield	62.2	79.5	98.3	102.6	109.9	116.5	124.1	128.5	144.6
New Haven	321.6	375.5	432.5	430.5	452.8	474.2	495.7	516.7	542.5
CONNECTICUT	723.9	859.7	985.8	990.9	1,025.2	1,085.5	1,146.6	1,206.9	1,260.4
REGION	8,225.8	9,009.7	10,274.9	10,430.9	10,665.5	11,177.9	11,742.0	12,281.3	12,771.1

Source: Urbanomics (9/21/95)

Table 2-12 Total Employment Projections by County

(Employment in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	251.3	217.0	245.6	250.6	258.7	266.0	278.4	292.0	303.3
Kings	631.8	516.4	540.4	559.1	557.6	554.4	568.4	585.3	611.8
New York	2,550.3	2,277.6	2,455.2	2,276.9	2,378.3	2,491.5	2,580.4	2,638.4	2,701.4
Queens	586.0	536.7	618.6	598.8	613.8	635.8	663.7	698.2	731.8
Richmond	47.1	66.4	97.6	101.1	105.6	109.2	114.0	120.1	125.8
NEW YORK CITY	4,066.5	3,614.1	3,957.4	3,786.5	3,914.0	4,056.9	4,204.9	4,334.0	4,474.1
Nassau	575.2	661.0	729.6	724.6	757.2	786.9	812.4	832.6	854.6
Suffolk	287.4	432.2	590.5	586.1	600.1	642.0	704.1	770.3	850.4
LONG ISLAND	862.6	1,093.2	1,320.1	1,310.7	1,357.3	1,428.9	1,516.5	1,602.9	1,705.2
Dutchess	92.1	110.2	139.5	123.9	134.9	146.8	155.3	159.4	163.5
Orange	80.3	95.5	127.8	135.9	151.7	162.0	173.8	186.2	198.6
Putnam	11.7	17.0	25.6	27.1	30.1	32.4	34.7	37.6	42.9
Rockland	73.1	98.1	122.2	123.2	128.5	135.5	142.6	150.3	159.3
Sullivan	22.8	26.8	31.5	30.6	32.5	34.1	35.7	37.7	40.6
Ulster	48.8	58.3	75.6	72.6	80.3	84.8	88.7	93.1	99.3
Westchester	363.2	419.5	479.3	452.5	461.1	474.0	490.1	507.2	526.7
MID-HUDSON	692.0	825.4	1,001.5	965.8	1,019.1	1,069.6	1,120.9	1,171.5	1,230.9
NY SUBURBS	1,554.6	1,918.6	2,321.6	2,276.5	2,376.4	2,498.5	2,637.4	2,774.4	2,936.1
NY METRO	5,621.1	5,532.7	6,279.0	6,063.0	6,290.4	6,555.4	6,842.3	7,108.4	7,410.2
Bergen	370.0	454.2	528.1	522.5	541.7	558.5	578.1	601.6	624.8
Essex	452.0	427.7	425.1	412.8	429.8	437.5	442.0	446.7	452.3
Hudson	278.9	247.9	272.2	273.5	280.9	298.6	315.1	331.4	349.8
Hunterdon	23.9	32.3	51.2	60.5	65.2	72.0	81.4	91.6	99.4
Mercer	147.5	176.4	222.5	225.9	230.5	242.8	259.3	279.0	297.3
Middlesex	235.2	312.4	407.0	418.8	440.0	471.8	506.5	531.8	551.4
Monmouth	141.0	194.8	262.3	274.9	282.2	299.8	323.6	347.4	359.6
Morris	124.9	212.0	293.9	298.1	318.7	340.6	362.1	383.6	405.3
Ocean	53.9	96.4	143.9	155.5	170.4	181.2	194.5	212.1	226.6
Passaic	203.1	208.8	222.5	214.3	214.4	219.5	228.8	234.8	233.4
Somerset	68.6	108.9	166.0	186.8	205.4	222.5	238.3	253.8	266.1
Sussex	20.2	29.9	41.1	42.2	44.3	47.6	51.2	56.2	60.4
Union	299.0	291.7	300.1	291.6	299.5	312.8	324.1	333.2	334.8
Warren	29.5	34.7	41.6	42.0	45.3	48.5	50.9	53.3	56.8
NEW JERSEY	2,447.7	2,828.1	3,377.5	3,419.4	3,568.3	3,753.7	3,955.9	4,156.5	4,318.0
Fairfield	345.4	434.3	503.5	505.9	527.1	558.1	580.9	598.0	613.2
Litchfield	51.4	67.2	81.9	84.6	91.3	98.4	105.8	113.8	123.6
New Haven	330.6	367.8	431.5	409.7	420.2	440.0	464.2	493.0	513.9
CONNECTICUT	727.4	869.3	1,016.9	1,000.2	1,038.6	1,096.5	1,150.9	1,204.8	1,250.7
REGION	8,796.2	9,230.1	10,673.4	10,482.6	10,897.3	11,405.6	11,949.1	12,469.7	12,978.9

Source: Urbanomics (9/20/95)

Table 2-13 Payroll Employment Projections by County

(Employment in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	216.8	192.4	218.0	217.8	224.3	227.3	234.3	246.0	262.8
Kings	537.6	434.7	459.2	461.3	454.9	450.3	466.8	482.7	509.7
New York	2,454.5	2,171.4	2,282.1	2,073.2	2,161.7	2,256.1	2,322.5	2,356.0	2,371.1
Queens	499.3	450.4	527.0	492.9	503.3	519.8	540.9	566.1	601.5
Richmond	37.3	52.9	79.8	82.3	87.0	90.4	94.9	100.1	106.5
NEW YORK CITY	3,745.5	3,301.8	3,566.1	3,327.5	3,431.2	3,543.9	3,659.4	3,750.9	3,851.6
Nassau	486.5	554.0	621.9	586.7	608.5	634.4	658.2	674.9	692.1
Suffolk	239.1	361.5	501.7	481.9	488.3	519.3	567.3	615.7	672.4
LONG ISLAND	725.6	915.5	1,123.6	1,068.6	1,096.8	1,153.7	1,225.5	1,290.6	1,364.5
Dutchess	82.5	97.6	121.1	103.0	113.3	123.7	130.5	132.5	134.7
Orange	68.7	80.9	108.0	112.5	124.9	132.0	140.6	149.8	159.0
Putnam	8.8	12.3	18.9	19.3	21.3	22.7	24.0	25.6	28.4
Rockland	62.4	81.5	102.0	99.8	104.3	110.9	116.5	121.9	127.1
Sullivan	18.3	21.5	25.7	24.3	25.8	26.9	27.8	28.9	30.6
Ulster	41.6	48.7	61.8	56.6	63.2	67.0	70.2	73.3	77.8
Westchester	304.0	352.2	406.7	372.8	378.5	390.5	405.9	419.2	431.2
MID-HUDSON	586.3	694.7	844.2	788.3	831.3	873.7	915.5	951.2	988.8
NY SUBURBS	1,311.9	1,610.2	1,967.8	1,856.9	1,928.1	2,027.4	2,141.0	2,241.8	2,353.3
NY METRO	5,057.4	4,912.0	5,533.9	5,184.4	5,359.3	5,571.3	5,800.4	5,992.7	6,204.9
Bergen	324.0	394.9	452.5	436.2	451.2	461.3	471.0	482.6	495.7
Essex	413.7	392.0	379.5	363.1	376.4	381.9	385.5	388.8	392.9
Hudson	259.5	227.8	246.0	242.9	247.8	262.3	274.6	286.0	299.7
Hunterdon	19.0	25.4	37.8	44.6	47.2	51.9	58.7	65.8	71.5
Mercer	135.4	162.2	198.0	197.3	200.0	210.2	223.2	238.7	252.3
Middlesex	217.2	287.9	362.5	365.7	381.2	408.3	437.9	459.0	475.5
Monmouth	119.9	165.0	217.9	222.6	228.1	242.1	260.3	278.6	287.4
Morris	108.5	187.6	256.1	253.3	268.4	284.9	301.2	317.6	334.2
Ocean	42.5	77.3	113.4	120.6	132.3	140.3	150.7	164.6	175.5
Passaic	184.4	189.0	195.5	183.5	181.0	183.3	189.7	193.9	193.0
Somerset	59.8	96.5	142.8	158.4	173.8	187.5	199.5	211.0	219.4
Sussex	16.1	23.2	29.7	28.6	29.1	30.7	32.6	35.8	39.1
Union	273.1	266.2	265.2	250.6	254.1	263.3	270.5	276.1	276.4
Warren	25.2	29.4	34.2	33.3	35.8	38.3	40.2	41.9	44.6
NEW JERSEY	2,198.3	2,524.4	2,931.1	2,900.7	3,006.4	3,146.3	3,295.6	3,440.4	3,557.2
Fairfield	302.9	372.4	419.9	405.3	414.9	437.3	452.8	464.6	475.2
Litchfield	42.9	54.4	63.8	63.6	68.1	72.8	77.6	82.9	89.6
New Haven	298.8	326.3	372.1	344.9	349.5	362.9	380.5	402.7	416.5
CONNECTICUT	644.6	753.1	855.8	813.8	832.5	873.0	910.9	950.2	981.3
REGION	7,900.3	8,189.5	9,320.8	8,898.9	9,198.2	9,590.6	10,006.9	10,383.3	10,743.4

Source: Urbanomics (9/29/95)

2.7.2 2.8.2 NYMTC Journey-to-Work Forecasts

The NYMTC Journey-to-Work forecasts represent existing and projected county-to-county flows of journey-to-work travel. These forecasts were prepared by Urbanomics for NYMTC using existing journey-to-work travel patterns from the 1990 Census and projections of county-level labor force and employment. The growth rates implied by a comparison of 1995 and 2010 journey-to-work travel were used to adjust 1995 work-related travel patterns to represent expected 2010 conditions. A similar adjustment was used to create the Year 2020 trip tables. The process used to develop the future year trip tables is described later in this chapter.

Table 2-14 presents the NYMTC County-to-County Journey-to-Work Forecasts for 1990. Tables 2-15, 2-16, and 2-17 present the forecasts for 1995, 2010, and 2020, respectively.

Table 2-14 1990 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	332,026	2,742	18,650	742	110	1,118	320	15,654
Litchfield	8,552	49,109	11,982	514	10	192	20	636
New Haven	46,961	7,772	299,143	87	27	69	20	757
CONNECTICUT	387,539	59,623	329,775	1,343	147	1,379	360	17,047
Bergen	859	-	101	78	234	22	5,475	5,005
Essex	163	-	5	-	41	-	370	504
Hudson	43	-	16	17	-	-	321	857
Hunterdon	19	-	2	-	8	-	-	10
Mercer	10	-	33	23	32	-	5	65
Middlesex	45	-	26	37	31	7	85	290
Monmouth	64	-	7	9	46	-	50	280
Morris	116	-	34	6	9	-	192	297
Ocean	10	-	3	-	-	-	51	102
Passaic	171	-	25	16	302	-	1,088	701
Somerset	32	-	11	-	-	-	19	53
Sussex	-	-	14	-	771	2	84	85
Union	86	-	20	12	13	-	112	249
Warren	-	-	-	-	-	-	18	21
NEW JERSEY	1,618	-	297	198	1,487	31	7,870	8,519
Dutchess	1,345	982	171	93,079	2,287	3,135	365	11,270
Orange	463	6	32	5,634	91,447	276	8,710	4,421
Putnam	2,476	91	50	1,466	364	11,764	278	19,564
Rockland	827	14	20	238	1,287	74	70,648	10,074
Sullivan	2	-	-	167	4,110	-	173	128
Ulster	75	-	51	9,971	6,559	58	365	614
Westchester	14,892	56	433	1,125	549	1,678	3,274	268,758
MID-HUDSON	20,080	1,149	757	111,680	106,603	16,985	83,813	314,829
Nassau	675	-	77	125	192	20	240	3,983
Suffolk	338	19	80	95	244	65	67	1,389
LONG ISLAND	1,013	19	157	220	436	85	307	5,372
Bronx	1,432	-	22	157	140	122	1,072	26,390
Kings	438	-	68	120	132	39	942	5,296
Manhattan	9	23	121	212	133	106	1,198	8,677
Queens	1,109	11	85	329	102	58	1,170	10,339
Richmond	25	-	-	19	26	9	103	809
NEW YORK CITY	3,013	34	296	837	533	334	4,485	51,511
RES IN REGION	413,263	60,825	331,282	114,278	109,206	18,814	96,835	397,278
RES OUT WK IN	7,854	5,012	27,506	3,868	2,996	175	641	3,588
TOT TRIP-BASED	421,117	65,837	358,788	118,146	112,202	18,989	97,476	400,866

(Continued)

Table 2-14 1990 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	667	163	1,235	517	24,285	1,481	18	399,728
Litchfield	29	36	71	26	984	163	3	72,327
New Haven	83	7	80	141	1,307	252	17	356,723
CONNECTICUT	779	206	1,386	684	26,576	1,896	38	828,778
Bergen	1,354	214	6,130	3,830	60,013	3,681	1,183	88,179
Essex	578	110	777	1,929	25,750	1,303	626	32,156
Hudson	1,066	186	1,628	3,026	52,292	1,774	2	61,228
Hunterdon	16	3	59	48	937	65	189	1,356
Mercer	44	11	78	297	4,963	134	114	5,809
Middlesex	442	102	575	2,817	24,030	997	2,013	31,497
Monmouth	361	74	150	2,717	19,050	971	2,334	26,113
Morris	173	69	356	611	9,385	468	6	11,722
Ocean	102	41	104	438	2,870	224	2	3,947
Passaic	214	62	562	815	7,796	541	9	12,302
Somerset	95	40	54	343	5,064	143	360	6,214
Sussex	26	8	59	224	1,474	172	66	2,985
Union	354	56	203	1,237	14,414	612	18	17,386
Warren	23	-	38	18	417	40	26	601
NEW JERSEY	4,848	976	10,773	18,350	228,455	11,125	6,948	301,495
Dutchess	147	50	633	270	2,814	244	14	116,806
Orange	291	48	1,976	794	7,032	648	85	121,863
Putnam	129	43	1,647	326	3,418	391	58	42,065
Rockland	467	126	6,704	1,586	17,369	1,343	246	111,023
Sullivan	57	47	55	130	465	115	20	5,469
Ulster	58	23	136	116	925	140	31	19,122
Westchester	2,149	434	27,227	4,179	80,628	6,418	836	412,636
MID-HUDSON	3,298	771	38,378	7,401	112,651	9,299	1,290	828,984
Nassau	370,979	48,205	6,216	28,430	97,205	68,213	1,066	625,626
Suffolk	98,515	455,018	3,072	9,730	38,505	26,605	379	634,121
LONG ISLAND	469,494	503,223	9,288	38,160	135,710	94,818	1,445	1,259,747
Bronx	3,035	690	173,214	16,283	170,318	18,450	944	412,269
Kings	10,080	2,253	10,641	436,222	343,762	53,832	5,824	869,649
Manhattan	6,118	1,739	21,043	26,955	594,659	20,160	1,934	683,087
Queens	58,565	7,710	20,677	84,350	344,001	351,726	4,036	884,268
Richmond	962	205	1,116	25,256	54,292	3,894	72,972	159,688
NEW YORK CITY	78,760	12,597	226,691	589,066	1,507,032	448,062	85,710	3,008,961
RES IN REGION	557,179	517,773	286,516	653,661	2,010,424	565,200	95,431	6,227,965
RES OUT WK IN	4,459	2,298	1,786	6,623	19,493	7,081	3,742	97,122
TOT TRIP-BASED	561,638	520,071	288,302	660,284	2,029,917	572,281	99,173	6,325,087

Table 2-15 1995 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	334,008	2,700	17,052	587	102	1,171	322	16,734
Litchfield	9,406	51,725	11,756	410	10	220	22	748
New Haven	50,046	8,028	292,547	73	27	76	21	850
CONNECTICUT	393,460	62,452	321,355	1,071	139	1,467	366	18,332
Bergen	889	-	95	63	223	24	5,666	5,484
Essex	173	-	5	-	40	-	393	566
Hudson	47	-	16	14	-	-	350	987
Hunterdon	18	-	2	-	7	-	-	10
Mercer	8	-	23	15	24	-	4	55
Middlesex	47	-	25	31	30	8	88	317
Monmouth	65	-	6	7	43	-	51	302
Morris	113	-	30	5	8	-	187	307
Ocean	12	-	3	-	-	-	59	125
Passaic	195	-	26	14	313	-	1,236	836
Somerset	31	-	10	-	-	-	19	55
Sussex	-	-	16	-	859	3	103	109
Union	96	-	21	11	13	-	125	289
Warren	-	-	-	-	-	-	20	25
NEW JERSEY	1,693	-	278	161	1,562	34	8,301	9,467
Dutchess	1,555	1,083	181	82,719	2,392	3,734	421	13,692
Orange	559	7	35	5,153	98,992	343	10,488	5,600
Putnam	2,496	89	45	1,117	336	12,418	281	21,135
Rockland	836	14	18	186	1,197	78	71,477	10,860
Sullivan	3	-	-	205	5,818	-	279	212
Ulster	92	-	57	9,235	7,212	73	448	793
Westchester	12,377	48	318	713	434	1,516	2,780	246,490
MID-HUDSON	17,919	1,241	656	99,327	116,382	18,162	86,174	298,782
Nassau	636	-	64	89	167	20	227	4,057
Suffolk	288	16	59	59	193	59	57	1,308
LONG ISLAND	924	16	123	148	360	79	284	5,365
Bronx	1,123	-	14	85	102	105	848	23,385
Kings	340	-	44	62	94	33	739	4,684
Manhattan	8	20	95	144	110	100	1,071	8,406
Queens	961	10	64	209	82	54	1,019	9,857
Richmond	21	-	-	11	20	8	87	758
NEW YORK CITY	2,453	30	217	511	409	300	3,764	47,090
RES IN REGION	416,449	63,740	322,629	101,217	118,851	20,043	98,890	379,036
RES OUT WK IN	7,174	4,600	23,450	3,075	2,646	166	587	3,447
TOT TRIP-BASED	423,623	68,339	346,079	104,293	121,497	20,208	99,477	382,482

(Continued)

Table 2-15 1995 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	709	180	1,382	574	25,505	1,586	20	402,634
Litchfield	34	44	87	31	1,137	190	4	75,823
New Haven	93	8	93	161	1,447	282	20	353,771
CONNECTICUT	836	232	1,561	766	28,088	2,058	44	832,227
Bergen	1,477	241	6,982	4,317	64,693	4,028	1,372	95,553
Essex	647	127	901	2,209	28,477	1,456	740	35,734
Hudson	1,227	220	1,930	3,536	59,374	2,030	2	69,734
Hunterdon	16	3	64	52	941	67	207	1,387
Mercer	36	10	74	284	6,223	118	108	6,983
Middlesex	481	114	650	3,152	25,870	1,087	2,313	34,212
Monmouth	388	82	169	3,032	20,211	1,048	2,673	28,078
Morris	177	74	387	660	9,516	486	7	11,955
Ocean	125	51	129	531	3,472	270	3	4,779
Passaic	256	76	680	970	9,190	637	11	14,440
Somerset	98	43	59	372	5,179	149	398	6,413
Sussex	34	10	75	279	1,874	216	86	3,665
Union	412	66	240	1,438	16,570	704	22	20,006
Warren	27	-	45	21	487	47	32	704
NEW JERSEY	5,402	1,118	12,383	20,853	252,077	12,342	7,972	333,643
Dutchess	179	62	780	327	3,378	292	18	110,815
Orange	370	62	2,520	991	8,812	806	111	134,850
Putnam	138	48	1,874	367	3,619	423	67	44,454
Rockland	500	140	7,581	1,777	18,377	1,45[illegible]	283	114,773
Sullivan	97	78	86	196	772	18[illegible]	33	7,962
Ulster	75	30	176	147	1,182	177	41	19,741
Westchester	1,954	424	27,710	4,297	76,035	6,100	866	382,062
MID-HUDSON	3,314	845	40,727	8,101	112,176	9,431	1,419	814,656
Nassau	373,441	51,157	6,783	30,868	96,676	70,175	1,181	635,541
Suffolk	90,901	452,299	3,202	10,150	35,112	25,630	400	619,734
LONG ISLAND	464,342	503,456	9,985	41,018	131,789	95,805	1,580	1,255,275
Bronx	2,615	654	174,991	16,536	144,971	16,913	963	383,303
Kings	8,659	2,137	10,789	444,560	291,474	49,313	5,965	818,896
Manhattan	5,833	1,764	22,166	28,364	560,801	19,866	2,061	650,810
Queens	54,793	7,743	21,708	88,543	318,051	342,367	4,288	849,748
Richmond	882	203	1,164	26,377	49,179	3,739	77,048	159,499
NEW YORK CITY	72,781	12,502	230,819	604,380	1,364,476	432,199	90,325	2,862,255
RES IN REGION	546,674	518,152	295,476	675,119	1,888,605	551,835	101,342	6,098,057
RES OUT WK IN	4,237	2,272	1,813	6,733	18,416	6,891	3,820	89,327
TOT TRIP-BASED	550,911	520,424	297,289	681,852	1,907,021	558,726	105,162	6,187,384

Table 2-16 2010 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	377,532	3,245	19,033	938	113	1,547	365	19,379
Litchfield	10,897	64,970	13,431	744	11	309	26	893
New Haven	57,516	9,778	332,397	118	30	102	25	999
CONNECTICUT	445,945	77,993	364,860	1,800	154	1,958	415	21,271
Bergen	991	-	105	100	244	31	6,327	6,274
Essex	202	-	6	-	45	-	458	673
Hudson	53	-	18	23	-	-	394	1,141
Hunterdon	21	-	2	-	8	-	-	12
Mercer	8	-	24	21	25	-	4	59
Middlesex	54	-	28	49	34	10	102	374
Monmouth	75	-	7	12	49	-	59	358
Morris	119	-	31	7	9	-	199	334
Ocean	12	-	3	-	-	-	63	137
Passaic	214	-	28	22	339	-	1,364	946
Somerset	33	-	10	-	-	-	20	59
Sussex	-	-	18	-	954	3	117	127
Union	100	-	21	15	14	-	131	312
Warren	-	-	-	-	-	-	22	28
NEW JERSEY	1,883	-	302	249	1,721	44	9,259	10,834
Dutchess	1,292	1,014	143	100,738	2,024	3,772	353	12,091
Orange	758	10	48	10,252	129,453	545	14,211	7,700
Putnam	2,727	106	48	1,822	361	16,211	307	23,837
Rockland	989	17	21	318	1,379	109	84,679	13,132
Sullivan	4	-	-	340	6,466	-	316	248
Ulster	86	-	52	12,939	6,744	83	421	779
Westchester	12,997	55	326	1,140	449	1,917	2,929	268,361
MID-HUDSON	18,853	1,201	639	127,549	146,877	22,636	103,216	326,147
Nassau	711	-	71	149	183	26	254	4,661
Suffolk	369	22	76	118	238	91	74	1,696
LONG ISLAND	1,080	22	147	267	421	117	327	6,357
Bronx	1,176	-	15	152	105	137	892	25,609
Kings	388	-	49	126	105	47	844	5,513
Manhattan	8	23	97	223	114	125	1,118	9,065
Queens	1,056	11	69	360	88	72	1,124	11,196
Richmond	27	-	-	24	25	13	112	983
NEW YORK CITY	2,656	35	229	884	437	393	4,090	52,366
RES IN REGION	470,416	79,251	366,177	130,750	149,609	25,148	117,308	416,975
RES OUT WK IN	6,264	4,326	19,958	3,319	2,363	162	516	3,123
TOT TRIP-BASED	476,680	83,577	386,135	134,069	151,972	25,310	117,824	420,097

(Continued)

Table 2-16 2010 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	805	197	1,526	592	29,936	1,769	22	456,998
Litchfield	40	49	98	32	1,379	217	4	93,098
New Haven	107	9	103	168	1,724	319	22	403,417
CONNECTICUT	952	254	1,727	793	33,039	2,305	48	953,513
Bergen	1,656	261	7,644	4,422	74,956	4,446	1,471	108,925
Essex	756	142	1,016	2,321	34,384	1,665	819	42,487
Hudson	1,387	240	2,130	3,633	69,504	2,258	3	80,781
Hunterdon	19	4	71	54	1,121	76	227	1,614
Mercer	39	10	77	284	6,828	124	111	7,614
Middlesex	559	128	729	3,312	30,987	1,236	2,552	40,157
Monmouth	451	92	190	3,177	24,299	1,193	2,947	32,909
Morris	189	76	408	659	10,465	514	7	13,016
Ocean	134	53	136	528	3,839	287	3	5,194
Passaic	283	81	740	987	10,526	698	12	16,241
Somerset	103	44	61	368	5,597	156	407	6,857
Sussex	38	11	84	290	2,207	242	94	4,186
Union	434	68	252	1,427	18,020	739	22	21,556
Warren	30	-	49	21	550	51	33	784
NEW JERSEY	6,079	1,210	13,587	21,481	293,281	13,684	8,707	382,321
Dutchess	152	53	708	283	2,979	257	15	125,876
Orange	502	79	3,189	1,145	12,361	1,050	139	181,443
Putnam	152	51	2,026	370	4,135	460	71	52,684
Rockland	594	159	8,636	1,878	22,583	1,678	316	136,491
Sullivan	110	86	97	202	912	205	36	9,019
Ulster	71	28	172	135	1,167	171	39	22,888
Westchester	2,070	435	29,124	4,230	83,765	6,420	887	415,105
MID-HUDSON	3,651	892	43,953	8,244	127,902	10,241	1,503	943,506
Nassau	419,490	55,193	7,424	31,451	112,706	77,499	1,263	711,081
Suffolk	116,139	541,264	3,807	11,062	46,625	31,354	466	753,401
LONG ISLAND	535,629	596,457	11,231	42,513	159,331	108,853	1,729	1,464,482
Bronx	2,769	667	184,121	16,122	161,125	17,804	982	411,676
Kings	9,908	2,318	11,910	450,178	350,198	55,138	6,399	893,122
Manhattan	6,123	1,798	23,173	27,827	611,464	20,762	2,101	704,020
Queens	60,659	8,228	23,497	89,026	366,818	373,320	4,525	940,048
Richmond	1,125	243	1,382	28,623	65,300	4,565	89,586	192,005
NEW YORK CITY	80,584	13,253	244,082	611,775	1,554,905	471,589	103,593	3,140,871
RES IN REGION	626,895	612,066	314,581	684,806	2,168,458	606,672	115,580	6,884,694
RES OUT WK IN	3,739	2,027	1,687	6,141	16,635	6,270	3,475	80,003
TOT TRIP-BASED	630,634	614,093	316,268	690,947	2,185,093	612,942	119,055	6,964,697

Table 2-17 2020 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	403,880	3,708	22,501	831	128	1,799	434	21,285
Litchfield	11,925	76,940	16,651	646	13	371	32	1,007
New Haven	58,168	10,632	368,344	99	32	112	28	1,042
CONNECTICUT	473,972	91,280	407,497	1,577	173	2,282	493	23,334
Bergen	920	-	106	77	243	31	6,548	6,064
Essex	208	-	6	-	50	-	525	715
Hudson	54	-	20	20	-	-	452	1,209
Hunterdon	22	-	2	-	9	-	-	13
Mercer	9	-	28	19	28	-	5	65
Middlesex	60	-	35	46	39	12	126	428
Monmouth	85	-	9	11	57	-	73	410
Morris	120	-	34	6	9	-	220	345
Ocean	16	-	5	-	-	-	88	174
Passaic	216	-	31	19	362	-	1,527	984
Somerset	39	-	13	-	-	-	25	71
Sussex	-	-	20	-	1,012	4	130	131
Union	102	-	24	13	15	-	147	327
Warren	-	-	-	-	-	-	26	30
NEW JERSEY	1,849	-	334	210	1,824	47	9,893	10,965
Dutchess	1,717	1,395	217	108,792	2,766	5,357	522	16,131
Orange	802	11	56	8,850	145,769	633	16,869	8,412
Putnam	2,888	121	57	1,562	406	18,796	367	26,012
Rockland	960	18	23	254	1,431	116	92,124	13,237
Sullivan	4	-	-	314	7,747	-	400	288
Ulster	114	-	78	13,719	9,251	118	622	1,036
Westchester	13,406	61	380	943	494	2,173	3,422	286,062
MID-HUDSON	19,892	1,606	811	134,433	167,865	27,192	114,325	351,178
Nassau	725	-	81	123	199	30	292	4,920
Suffolk	397	26	92	101	273	107	90	1,882
LONG ISLAND	1,122	26	173	224	472	137	382	6,801
Bronx	1,254	-	18	124	121	162	1,104	28,232
Kings	393	-	58	96	116	54	1,000	5,831
Manhattan	8	25	107	179	120	136	1,248	9,308
Queens	1,073	13	79	290	96	80	1,302	11,807
Richmond	26	-	-	18	26	14	125	1,000
NEW YORK CITY	2,754	38	262	707	480	445	4,780	56,178
RES IN REGION	499,589	92,949	409,077	137,151	170,813	30,103	129,872	448,457
RES OUT WK IN	5,862	4,265	19,559	2,811	2,309	160	513	2,995
TOT TRIP-BASED	505,451	97,215	428,636	139,962	173,122	30,263	130,385	451,452

(Continued)

Table 2-17 2020 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	889	231	1,703	649	32,502	2,025	26	492,589
Litchfield	45	59	112	36	1,533	258	5	109,633
New Haven	112	10	111	178	1,774	348	24	441,015
CONNECTICUT	1,046	300	1,926	864	35,809	2,631	55	1,043,238
Bergen	1,595	272	7,743	4,458	71,169	4,539	1,537	105,303
Essex	805	162	1,107	2,493	36,016	1,851	925	44,863
Hudson	1,474	273	2,320	3,902	72,617	2,512	3	84,855
Hunterdon	20	4	78	58	1,191	85	257	1,739
Mercer	42	12	84	304	7,388	138	125	8,245
Middlesex	643	155	839	3,730	35,079	1,463	3,050	45,706
Monmouth	520	112	219	3,587	27,554	1,419	3,539	37,597
Morris	195	84	433	690	10,671	554	7	13,369
Ocean	173	72	172	646	4,875	378	3	6,602
Passaic	295	90	794	1,045	10,790	761	13	16,927
Somerset	125	56	73	426	6,704	193	504	8,228
Sussex	40	13	90	306	2,247	263	104	4,360
Union	456	76	270	1,512	18,642	807	25	22,415
Warren	33	-	54	23	593	57	38	855
NEW JERSEY	6,417	1,381	14,275	23,180	305,536	15,020	10,131	401,062
Dutchess	206	74	913	352	3,967	350	21	142,781
Orange	550	94	3,586	1,268	13,311	1,208	162	201,581
Putnam	167	60	2,256	405	4,452	526	82	58,156
Rockland	599	173	9,052	1,950	22,388	1,785	343	144,452
Sullivan	128	107	115	236	1,047	250	44	10,680
Ulster	97	40	224	170	1,545	234	54	27,301
Westchester	2,216	500	31,732	4,539	87,993	7,180	1,006	442,106
MID-HUDSON	3,963	1,049	47,878	8,919	134,703	11,533	1,713	1,027,059
Nassau	444,003	62,843	8,054	33,638	117,188	85,986	1,424	759,507
Suffolk	129,648	649,553	4,304	12,273	51,011	36,550	551	886,858
LONG ISLAND	573,652	712,397	12,358	45,911	168,200	122,536	1,975	1,646,365
Bronx	3,079	801	206,516	17,735	174,946	20,700	1,155	455,946
Kings	10,521	2,694	13,021	484,586	363,338	62,079	7,332	951,118
Manhattan	6,293	1,992	24,575	29,168	617,751	22,443	2,310	715,663
Queens	64,175	9,410	25,501	95,220	380,610	415,297	5,117	1,010,072
Richmond	1,145	270	1,468	30,055	65,196	4,943	99,163	203,449
NEW YORK CITY	85,213	15,167	271,081	656,764	1,601,840	525,462	115,078	3,336,248
RES IN REGION	670,290	730,294	347,518	735,637	2,246,087	677,181	128,952	7,453,971
RES OUT WK IN	3,572	2,032	1,672	6,088	15,770	6,220	3,497	77,326
TOT TRIP-BASED	673,863	732,326	349,190	741,726	2,261,857	683,401	132,449	7,531,297

2.7.3 MTA/AKRF Sub-County Forecasts of Population and Establishment Employment

Sub-county forecasts of population and employment are used to provide detail on where population and employment growth is expected to occur within each County. This data was assembled for each MTA Planning District (Planning Districts are shown in Figures 2-5, 2-6, and 2-7). Data on sub-county population and employment outside of Manhattan, Long Island City, and the Brooklyn CBD were obtained from the MTA Long Range Travel Forecast Study. Inside those areas, population and employment forecasts are based on an analysis of building vacancies and anticipated development conducted by AKRF.

Table 2-18 displays the resulting estimates of population and establishment employment. It should be noted that the MTA/AKRF forecasts of establishment employment are somewhat different from the official NYMTC county-level estimates of employment. This difference is due to the different original sources of information used to prepare the 1990 estimates of employment. The MTA/AKRF forecasts are based on information from the CTPP while the NYMTC forecasts are based on the Department of Labor's Bureau of Economic Analysis.

To assure that these models are faithful to the official, adopted NYMTC forecasts, the MTA RTF Model uses the MTA/AKRF forecasts of establishment employment solely as a means for disaggregating forecasted employment or journey-to-work travel from the county to the sub-county level.

Figure 2-5 MTA Transportation Planning Districts in Manhattan

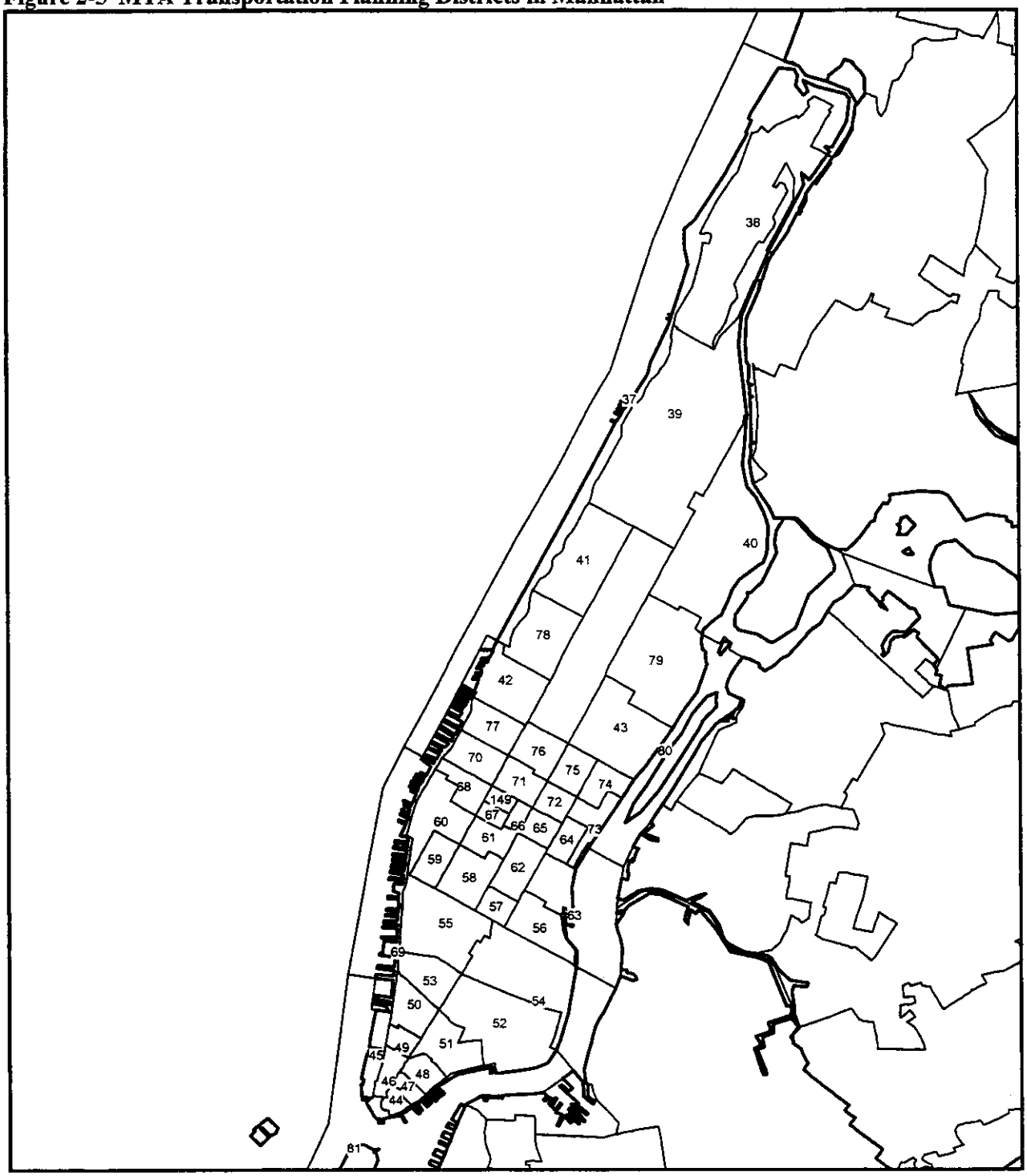


Figure 2-6 MTA Transportation Planning Districts in New York City Outside Manhattan



Figure 2-7 MTA Transportation Planning Districts in Region Outside New York City

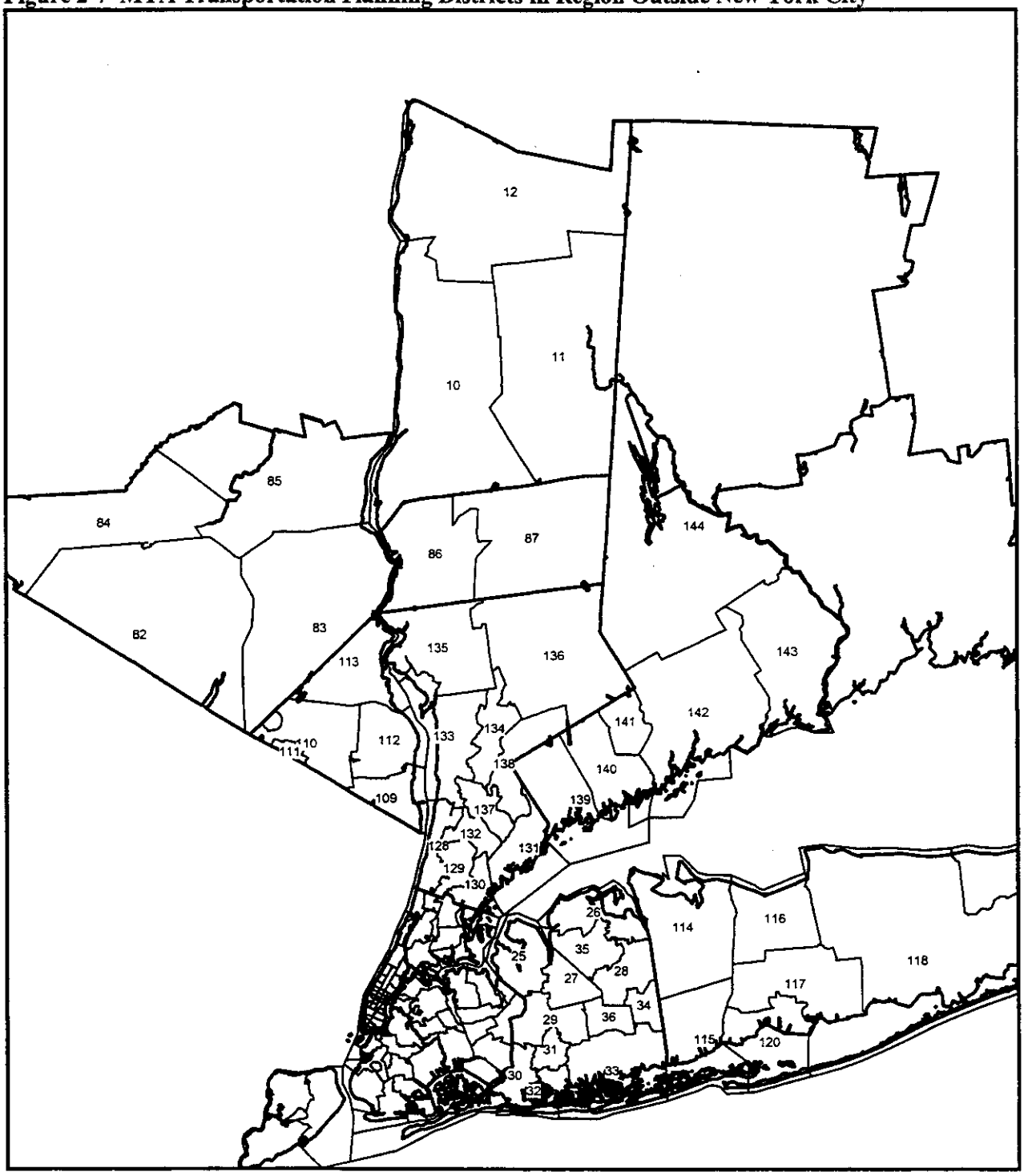


Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District

		Population			Establishment Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Bronx	1	73	111	140	569	604	680
	2	77,824	80,391	83,384	19,596	21,014	23,023
	3	372,427	389,133	405,667	84,482	89,227	98,116
	4	178,071	185,345	192,650	30,930	33,047	36,115
	5	178,743	183,917	190,126	51,161	54,243	59,343
	6	39,846	40,538	41,676	6,293	6,690	7,312
	7	259,641	272,982	285,618	90,490	95,205	103,723
	8	32,708	33,368	34,340	3,506	3,660	4,033
	9	53,275	54,513	56,196	9,498	9,995	10,894
	Total	1,192,608	1,240,298	1,289,797	296,525	313,685	343,239
Dutchess	10	190,028	211,822	230,360	80,492	101,817	104,724
	11	37,981	42,543	46,543	12,408	15,916	17,327
	12	31,793	35,536	38,699	10,335	12,303	12,974
	Total	259,802	289,901	315,602	103,235	130,036	135,025
Brooklyn	13	94	93	97	4,693	4,726	4,947
	14	411	411	420	9,044	10,189	13,951
	15	340,860	351,893	364,893	99,874	100,581	105,227
	16	73,654	73,996	75,748	81,018	81,453	84,835
	17	256,819	268,921	280,854	61,086	62,626	68,916
	18	323,412	333,370	345,639	63,365	63,795	66,717
	19	174,381	177,373	182,531	62,148	63,533	69,372
	20	278,315	288,216	299,250	55,078	55,468	58,058
	21	133,283	134,446	137,834	30,069	30,282	31,696
	22	367,819	373,909	384,939	94,981	95,981	101,459
	23	317,957	322,499	331,459	68,984	69,778	73,965
	24	8,702	8,571	8,725	44,022	52,539	62,539
	Total	2,275,707	2,333,698	2,412,389	674,363	690,952	741,733
Nassau	25	87,382	90,744	96,460	60,871	68,363	71,651
	26	53,996	56,388	60,059	18,350	20,361	21,149
	27	88,917	91,102	96,182	50,793	56,474	59,065
	28	107,752	110,553	116,734	66,905	75,579	80,215
	29	225,014	238,818	257,055	134,445	151,975	161,533
	30	95,312	97,324	102,526	31,417	35,067	36,787
	31	81,382	83,158	87,640	28,392	32,035	33,781
	32	92,342	96,058	102,123	27,026	30,492	32,208
	33	288,616	297,592	315,055	66,019	73,208	76,486
	34	53,563	55,301	58,579	26,253	29,680	31,711
	35	25,068	27,185	29,705	14,567	16,262	16,975
	36	102,950	105,573	111,487	25,734	28,490	29,924
	Total	1,302,294	1,349,796	1,433,605	550,772	617,986	651,485

(Continued)

Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District (continued)

		Population			Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Manhattan	37	515	515	515	7,338	7,652	7,652
	38	211,453	211,845	211,938	37,980	38,474	38,629
	39	207,439	215,198	217,026	50,472	56,549	58,048
	40E	50,840	52,925	53,416	8,321	10,484	10,639
	40W	52,863	54,926	55,411	17,960	23,336	23,491
	41	116,044	116,602	116,733	25,184	25,273	25,273
	42	29,600	35,080	36,864	31,884	39,754	43,045
	43E	45,557	46,651	47,291	35,307	37,855	38,688
	43W	24,826	25,158	25,236	43,744	47,071	47,690
	44	798	1,415	1,560	53,698	66,608	66,917
	45	6,599	12,896	14,379	15,627	27,184	27,184
	46	407	754	836	69,078	75,609	76,227
	47	174	215	225	68,615	84,287	84,906
	48	5,494	6,480	6,712	56,231	58,173	65,592
	49	2,030	2,347	2,422	39,454	42,818	44,756
	50	6,948	7,780	7,976	40,253	45,261	46,808
	51	25,037	25,037	25,037	54,818	55,286	55,441
	52	91,660	92,344	92,505	44,464	49,672	52,819
	53	9,566	9,566	9,566	28,109	35,217	37,013
	54	68,582	70,651	71,139	33,614	36,604	37,223
	55	66,006	66,856	67,057	53,212	56,528	56,683
	56	34,119	34,119	34,119	15,467	15,467	15,507
	57	8,858	8,882	8,888	27,199	31,534	32,462
	58	21,862	23,538	25,247	49,379	58,193	61,221
	59	18,099	18,174	18,234	10,408	11,835	11,838
	60	7,083	7,083	7,083	14,927	28,281	38,708
	61	5,730	5,936	5,985	35,471	45,140	46,686
	62	19,695	20,520	20,714	76,608	88,429	89,976
	63	25,147	26,072	26,290	18,169	18,276	18,276
	64	13,246	13,466	13,850	34,960	40,185	40,825
	65	7,864	7,864	7,864	59,905	73,207	74,445
	66	699	915	966	21,959	26,265	26,643
	67	247	247	247	28,112	32,981	33,290
	68	3,553	6,188	6,809	16,720	20,280	22,967
	69	369	369	369	257	1,214	1,307
	70	18,838	19,620	20,801	17,448	20,023	20,350
	71	3,068	3,556	4,155	94,130	129,565	137,994
	72	1,534	1,534	1,534	108,341	127,268	128,196
	73	15,812	16,139	16,620	27,101	29,200	29,266
	74	22,731	22,805	22,823	34,129	37,307	37,616
	75	3,533	3,776	3,833	115,914	134,368	135,915
	76	11,622	12,051	13,402	115,323	138,833	146,275
	77	19,338	19,534	21,190	20,823	22,760	26,317
	78	69,259	69,259	69,259	25,180	25,350	25,350
	79E	96,098	97,693	98,068	24,276	25,432	25,741
	79W	46,457	46,638	46,680	24,276	24,813	24,967
	80	8,543	11,316	11,969	3,500	3,837	3,837
	81	2,673	2,673	2,673	1,714	1,714	1,714
	149	1,481	1,481	1,481	36,262	53,661	59,517
	Total	1,509,996	1,556,692	1,574,996	1,873,319	2,185,114	2,261,887

Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District
(Continued)

		Population			Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Orange	82	63,531	76,746	86,294	21,728	28,220	32,624
	83	77,993	94,813	106,864	24,859	31,685	36,373
	84	72,433	87,187	97,747	32,224	39,457	44,059
	85	105,542	125,954	140,595	40,780	51,313	57,512
	Total	319,499	384,700	431,500	119,591	150,675	170,568
Putnam	86	19,048	20,205	21,218	3,338	4,450	5,487
	87	70,152	78,596	85,082	16,931	21,029	25,285
	Total	89,200	98,801	106,300	20,269	25,479	30,772
Queens	88	480	673	834	7,418	7,920	8,727
	695	3,925	17,425	17,716	11,871	21,614	25,939
	696	586	1,586	1,630	9,593	25,747	32,919
	692	256	266	285	6,120	6,457	6,607
	697	1,977	2,059	2,206	13,321	14,055	14,381
	699	3,016	3,141	3,365	526	555	568
	698	2,747	2,861	3,065	368	388	397
	707	533	555	594	192	202	207
	90	149,014	154,624	164,021	29,561	31,663	34,843
	91	397,574	419,662	448,956	79,967	85,539	94,512
	92	14,484	14,567	15,236	10,927	10,888	11,900
	93	57	77	92	25,664	27,009	29,794
	94	190,470	200,623	214,356	54,066	58,167	64,380
	95	132,352	136,069	143,683	20,415	22,121	24,665
	96	91,229	92,060	96,330	24,143	26,195	29,406
	97	145,987	150,101	158,491	17,199	18,659	20,921
	98	134,839	143,357	153,902	50,095	53,311	59,354
	99	154,069	158,949	168,128	38,422	40,678	44,870
	100	118,525	122,883	130,287	20,879	22,233	24,405
	101	209,459	218,631	232,672	23,707	25,607	28,388
	102	-	-	-	58,891	61,906	67,926
	103	102,407	104,707	110,299	16,549	18,054	20,275
	148	116,313	117,525	123,051	31,464	33,981	38,027
	Total	1,970,299	2,062,401	2,189,198	550,727	612,948	683,411
Richmond	104	164,164	176,601	187,434	57,988	64,941	72,378
	105	119,567	135,548	147,738	15,863	17,788	19,734
	106	112,723	125,529	135,757	28,042	31,654	35,027
	107	1,780	1,969	2,120	444	490	550
	108	1,768	1,857	1,951	1,009	1,127	1,276
	Total	400,002	441,504	475,000	103,346	116,000	128,965
Rockland	109	48,613	52,149	55,514	30,192	35,538	39,223
	110	84,088	90,238	96,091	23,331	27,848	30,566
	111	15,345	16,401	17,420	6,721	7,914	8,911
	112	79,567	85,478	91,064	26,625	31,003	34,194
	113	47,186	51,234	54,909	12,605	14,636	15,934
	Total	274,799	295,500	314,998	99,474	116,939	128,828

(Continued)

Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District (continued)

		Population			Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Suffolk	114	195,123	216,617	240,249	101,255	119,821	140,639
	115	206,739	229,565	254,629	80,705	93,175	108,502
	116	115,605	128,309	142,284	45,857	54,224	64,099
	117	229,517	254,708	282,434	88,907	102,862	120,916
	118	407,303	452,200	501,515	120,019	145,432	177,258
	119	108,651	120,283	133,212	48,234	57,631	70,085
	120	84,159	93,514	103,776	28,585	34,338	41,225
	Total	1,347,097	1,495,196	1,658,099	513,562	607,483	722,724
Westchester	128	154,981	157,560	159,083	42,623	46,349	49,350
	129	117,944	117,011	116,642	33,816	37,116	40,016
	130	120,702	121,358	121,762	48,130	52,111	55,097
	131	96,289	96,998	97,404	42,829	46,467	50,057
	132	39,820	38,373	38,258	17,858	19,504	20,940
	133	80,518	83,603	85,295	44,018	47,312	50,192
	134	37,198	37,150	37,135	14,379	15,356	16,169
	135	73,915	74,817	75,317	29,274	32,244	34,368
	136	73,150	76,293	78,143	27,562	29,899	31,856
	137	70,833	72,695	73,712	66,024	71,185	76,417
	138	20,245	21,475	22,245	15,707	16,654	17,751
	Total	885,595	897,333	904,996	382,220	414,197	442,213
Fairfield	139	59,081	62,705	66,996	33,958	39,782	42,282
	140	127,755	139,789	151,710	82,342	93,801	98,720
	141	18,236	19,234	20,499	7,040	8,349	8,937
	142	188,715	202,567	217,832	101,128	115,043	121,085
	143	278,058	299,703	323,067	123,405	135,319	141,549
	144	166,548	182,301	198,003	73,702	81,422	85,193
	Total	838,393	906,299	978,107	421,575	473,716	497,766
Litchfield	150	181,000	211,600	241,000	84,600	105,800	123,600
New Haven	151	807,600	857,500	903,700	409,700	464,200	513,900
Region		13,653,891	14,421,219	15,229,287	6,203,278	7,025,210	7,576,116

2.8 1995 Daily Person Trip Table

The 1995 daily person trip table used in the MTA RTF Model represents nearly all travel in the New York and Connecticut portions of the metropolitan area. It is based on three sources of information:

- 1990 Census Transportation Planning Package (CTPP) data on workers by Census Tract of Residence, Census Tract of Work, and customary mode of travel.

- 1989 MTA Comprehensive Telephone Travel Survey (CTTS) data on total trip-making for 72 zones in the MTA service area.

- Observed 1995 ridership on NYCT, LIRR, and MNR services used as the basis for adjusting the 1990 CTPP/1989 CTTS data to be representative of 1995 conditions.

The first two sources of data were used to construct a Year 1990 trip table that builds on the strengths of each:

- The CTPP data is based on a very large sample of potential trip makers and factored to represent all workers over 16 in the region. It is geographically coded to a very fine level-of-detail: Census Block Groups-subsets of the zones used in the MTA RTF Model. The CTPP data set provides information on the residential location of workers over 16 and their place of employment. It also includes information on the predominate mode-to-work used during the week prior to the 1990 Census.

- The CTTS survey data are based on a telephone survey conducted in 1989 that included complete trip logs for 41,783 trips. The survey is geographically coded at the MTA super zone level; there are 73 super zones in the MTA service area. The super zone system subdivides the New York counties as follows:
    - Manhattan - 25 super zones
    - Bronx - 5 super zones
    - Queens - 8 super zones
    - Brooklyn - 9 super zones
    - Staten Island - 1 super zone
    - Westchester - 8 super zones
    - Putnam - 1 super zone
    - Dutchess - 1 super zone
    - Rockland - 1 super zone
    - Orange - 1 super zone
    - Fairfield/New Haven - 1 super zone
    - Nassau - 9 super zones
    - Suffolk - 3 super zones

  The information included in the CTTS provides insight on total trip-making for all purposes.

Neither data source is adequate by itself to develop a satisfactory Year 1990 trip table, but together these two data sets provide both the detail and the coverage necessary to represent most regional travel. The CTPP provides the necessary detail in terms of both fineness of geographic coding and sample size while the CTTS provides information on all trip purposes and on frequency of travel.

The 1995 person trip tables are based on the Year 1990 CTPP/CTTS Trip Tables with two key adjustments:

1. Trips on zone-to-zone interchanges where a qualified path does not exist are either reassigned to a path that does exist or are eliminated from the trip table. This eliminates potential inconsistencies between the modeled networks and the modeled trip tables.

2. The resulting mode-specific trip tables are assigned to the 1995 base networks and assignment results are compared to observed 1995 ridership data. As necessary, the trip table is adjusted so that assignment results match observed ridership counts.

Table 2-19 summarizes the original 1990 trip tables and the adjusted 1995 person trip tables.

Table 2-19 Base 1990 and 1995 Daily Person Trip Table by Mode

Year 1990 Base Trip Tables

Mode	Purpose			
	Home-Based Work	Home-Based Other	Non-Home-Based	Total
Automobile	4,759,425	6,912,704	1,710,121	13,185,827
Commuter Rail	347,918	161,772	69,176	578,866
Subway	1,932,347	1,242,981	580,527	3,755,855
Bus	700,703	1,174,022	222,019	2,096,744
Total	7,740,393	9,491,479	2,581,843	19,813,715

Year 1995 Corrected Trip Tables

Mode	Purpose			
	Home-Based Work	Home-Based Other	Non-Home-Based	Total
Automobile	4,657,142	6,818,564	1,710,121	13,185,827
Commuter Rail	302,233	167,475	74,404	544,112
Subway	1,847,061	1,092,451	534,507	3,474,019
Bus	470,140	780,349	137,023	1,387,512
Total	7,276,576	8,858,838	2,455,605	18,591,019

2.9 Year 2010 and 2020 Daily Person Trip Table

The Year 2010 and 2020 base daily person trip tables are based on the Year 1995 person trip table, factored to represent expected changes in journey-to-work travel, population, and employment between 1995 and 2010 or 2020, respectively. The factoring process uses different procedures for home-based work and other purposes and is described in the subsections that follow.

2.9.1 Factoring Procedures for Year 2010 and 2020 Home-Based Work Trip Tables

Growth factors for adjusting the Year 1995 Home-Based Work (HBW) trip table to represent Year 2010 and 2020 socioeconomic conditions are based on county-to-county journey-to-work forecasts prepared by Urbanomics and subsequently stratified by KPMG to the MTA Transportation Planning District level. The factoring was performed as follows:

1. Each county of residence in the 1995 journey-to-work table (i.e., each row) is allocated among the different planning districts in the county according to the relative 1995 planning district population. A similar allocation is performed for the 2010 journey-to-work table and the 2020 journey-to-work using 2010 and 2020 population, respectively.

2. Each county of employment in the 1995 journey-to-work table (i.e., each column) is allocated among the different planning districts in the county according to the relative 1995 planning district establishment employment. A similar allocation is performed for the 2010 journey-to-work table and the 2020 journey-to-work using 2010 and 2020 establishment employment, respectively.

3. Year 1995-to-2010 growth factors are computed for each planning district-to-planning district combination by dividing 2010 journey-to-work trips (stratified to planning districts) by 1995 journey-to work trips. Year 1995-to-2020 growth factors are computed using a similar approach with the 2020 journey-to-work trips.

4. Each zone-to-zone entry in the 1995 trip table is multiplied by the appropriate (the corresponding production and attraction planning district) year 1995-to-2010 factor to create the 2010 trip table. A similar procedure is used to create the year 2020 trip table.

2.9.2 Factoring Procedures for Year 2010 and 2020 Home-Based Other and Non-Home-Based Trip Tables

Each zone-to-zone entry in the home-based other and non-home based trip tables are factored by the ratio of 2010 planning district population to 1995 planning district population to create the 2010 Home-Based Other (HBO) and Non-Home-Based (NHB) trip tables. A similar procedure is used to create the 2020 HBO and NHB trip tables. Population was used as the basis for this factoring rather than journey-to-work forecasts since it was felt that most non-work travel to Manhattan (e.g., cultural events and shopping) will continue to grow in rough proportion to the population in each planning district and will not be subject to the balancing between population and employment incorporated in the journey-to-work tables.

2.9.3 Resulting 2010 and 2020 Person Trip Tables

The results of the trip table factoring process are presented in Tables 2-20 through 2-25.

Table 2-20 Year 1995, 2010, and 2020 Home-Based Work Person Trips to All Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	566,829	613,566	677,977	8.2%	19.6%
Kings	1,116,455	1,241,432	1,322,380	11.2%	18.4%
New York	698,249	749,240	764,688	7.3%	9.5%
Queens	1,215,584	1,354,143	1,444,658	11.4%	18.8%
Richmond	290,622	362,369	375,769	24.7%	29.3%
NEW YORK CITY	3,887,739	4,320,750	4,585,472	11.1%	17.9%
Nassau	875,931	976,795	1,041,793	11.5%	18.9%
Suffolk	875,400	1,066,710	1,254,226	21.9%	43.3%
LONG ISLAND	1,751,331	2,043,505	2,296,019	16.7%	31.1%
Dutchess	151,297	174,915	195,996	15.6%	29.5%
Orange	67,377	90,197	101,321	33.9%	50.4%
Putnam	61,526	72,240	79,954	17.9%	30.0%
Rockland	179,293	213,130	226,170	18.9%	26.1%
Westchester	568,430	619,211	659,033	8.9%	15.9%
MID-HUDSON	1,027,923	1,169,693	1,262,474	13.8%	22.8%
Fairfield	532,345	604,110	651,126	13.5%	22.3%
Litchfield	59,358	71,407	83,871	20.3%	41.3%
New Haven	17,881	20,467	21,495	14.5%	20.2%
CONNECTICUT	609,584	695,984	756,492	14.2%	24.1%
REGION	7,276,577	8,229,932	8,900,457	13.1%	22.3%

Table 2-21 Year 1995, 2010, and 2020 Home-Based Other Person Trips to All Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	715,672	742,050	770,846	3.7%	7.7%
Kings	1,273,635	1,304,854	1,348,515	2.5%	5.9%
New York	747,585	766,215	774,329	2.5%	3.6%
Queens	1,328,595	1,387,292	1,472,075	4.4%	10.8%
Richmond	388,536	428,034	460,289	10.2%	18.5%
NEW YORK CITY	4,454,023	4,628,445	4,826,054	3.9%	8.4%
Nassau	1,269,470	1,314,772	1,395,795	3.6%	10.0%
Suffolk	1,248,576	1,385,491	1,536,541	11.0%	23.1%
LONG ISLAND	2,518,046	2,700,263	2,932,336	7.2%	16.5%
Dutchess	244,542	272,694	296,941	11.5%	21.4%
Orange	73,235	87,986	98,613	20.1%	34.7%
Putnam	125,826	139,574	150,271	10.9%	19.4%
Rockland	143,674	154,475	164,667	7.5%	14.6%
Westchester	817,062	828,162	835,436	1.4%	2.2%
MID-HUDSON	1,404,339	1,482,891	1,545,928	5.6%	10.1%
Fairfield	421,106	455,169	491,294	8.1%	16.7%
Litchfield	46,674	54,562	62,123	16.9%	33.1%
New Haven	14,649	15,543	16,378	6.1%	11.8%
CONNECTICUT	482,429	525,274	569,795	8.9%	18.1%
REGION	8,858,837	9,336,873	9,874,113	5.4%	11.5%

Table 2-22 Year 1995, 2010, and 2020 Non-Home-Based Person Trips to All Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	158,479	164,351	170,742	3.7%	7.7%
Kings	311,776	319,467	330,176	2.5%	5.9%
New York	431,463	447,654	454,350	3.8%	5.3%
Queens	323,935	338,794	359,613	4.6%	11.0%
Richmond	61,255	67,491	72,581	10.2%	18.5%
NEW YORK CITY	1,286,908	1,337,757	1,387,462	4.0%	7.3%
Nassau	365,018	378,103	401,438	3.6%	10.0%
Suffolk	246,468	273,465	303,260	11.0%	23.0%
LONG ISLAND	611,486	651,568	704,698	6.6%	15.2%
Dutchess	60,863	67,868	73,901	11.5%	21.4%
Orange	19,349	23,184	25,947	19.8%	34.1%
Putnam	23,291	25,838	27,820	10.9%	19.4%
Rockland	54,687	58,813	62,703	7.0%	14.7%
Westchester	266,288	269,947	272,307	1.4%	2.3%
MID-HUDSON	424,478	445,650	462,678	5.0%	9.0%
Fairfield	98,835	106,832	115,312	8.1%	16.7%
Litchfield	10,726	12,539	14,276	16.9%	33.1%
New Haven	23,172	24,585	25,906	6.1%	11.8%
CONNECTICUT	132,733	143,956	155,494	8.5%	17.1%
REGION	2,455,605	2,578,931	2,710,332	5.0%	10.4%

Table 2-23 Year 1995, 2010, and 2020 Home-Based Work Person Trips to Manhattan Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	279,209	311,479	339,454	11.6%	21.6%
Kings	464,252	560,967	583,112	20.8%	25.6%
New York	486,106	528,233	531,759	8.7%	9.4%
Queens	564,291	660,797	687,051	17.1%	21.8%
Richmond	150,356	201,193	199,827	33.8%	32.9%
NEW YORK CITY	1,944,214	2,262,669	2,379,766	16.4%	22.4%
Nassau	125,961	148,040	154,002	17.5%	22.3%
Suffolk	45,817	61,909	67,972	35.1%	48.4%
LONG ISLAND	171,778	209,949	227,182	22.2%	32.3%
Dutchess	3,369	3,147	4,167	-6.6%	23.7%
Orange	10,615	15,025	16,220	41.5%	52.8%
Putnam	6,183	7,073	7,618	14.4%	23.2%
Rockland	26,460	32,479	32,212	22.7%	21.7%
Westchester	112,390	124,202	129,790	10.5%	15.5%
MID-HUDSON	159,017	181,926	189,940	14.4%	19.4%
Fairfield	25,008	29,641	31,950	18.5%	27.8%
Litchfield	732	942	1,066	28.7%	45.6%
New Haven	1,414	1,697	1,734	20.0%	22.6%
CONNECTICUT	27,154	32,280	35,535	18.9%	30.9%
REGION	2,302,163	2,686,824	2,832,423	16.7%	23.0%

Table 2-24 Year 1995, 2010, and 2020 Home-Based Other Person Trips to Manhattan Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	183,966	190,747	198,179	3.7%	7.7%
Kings	203,765	208,584	215,471	2.4%	5.7%
New York	505,672	519,076	524,688	2.7%	3.8%
Queens	206,898	218,284	231,811	5.5%	12.0%
Richmond	28,942	31,883	34,285	10.2%	18.5%
NEW YORK CITY	1,129,273	1,168,574	1,204,434	3.5%	6.7%
Nassau	110,715	114,808	121,970	3.7%	10.2%
Suffolk	25,715	28,539	31,652	11.0%	23.1%
LONG ISLAND	136,430	143,347	153,622	5.1%	12.6%
Dutchess	7,800	8,701	9,477	11.6%	21.5%
Orange	9,238	11,153	12,533	20.7%	35.7%
Putnam	2,293	2,523	2,704	10.0%	17.9%
Rockland	20,743	22,269	23,718	7.4%	14.3%
Westchester	85,668	86,188	86,708	0.6%	1.2%
MID-HUDSON	125,742	130,834	135,140	4.0%	7.5%
Fairfield	28,982	31,231	33,644	7.8%	16.1%
Litchfield	1,688	1,973	2,246	16.9%	33.1%
New Haven	2,050	2,176	2,292	6.1%	11.8%
CONNECTICUT	32,720	35,380	38,182	8.1%	16.7%
REGION	1,424,165	1,478,135	1,531,378	3.8%	7.5%

Table 2-25 Year 1995, 2010, and 2020 Non-Home-Based Person Trips to Manhattan Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	21,699	22,480	23,361	3.6%	7.7%
Kings	45,301	46,385	47,921	2.4%	5.8%
New York	229,130	238,838	242,957	4.2%	6.0%
Queens	62,788	65,909	69,953	5.0%	11.4%
Richmond	5,424	5,974	6,423	10.1%	18.4%
NEW YORK CITY	364,342	379,586	390,615	4.2%	7.2%
Nassau	19,246	19,953	21,194	3.7%	10.1%
Suffolk	6,054	6,718	7,450	11.0%	23.1%
LONG ISLAND	25,300	26,671	28,644	5.4%	13.2%
Dutchess	558	622	678	11.5%	21.5%
Orange	126	152	171	20.6%	35.7%
Putnam	93	103	110	10.8%	18.3%
Rockland	237	254	271	7.2%	14.3%
Westchester	11,936	12,027	12,103	0.8%	1.4%
MID-HUDSON	12,950	13,158	13,333	1.6%	3.0%
Fairfield	5,617	6,050	6,517	7.7%	16.0%
Litchfield	132	154	176	16.7%	33.3%
New Haven	262	278	293	6.1%	11.8%
CONNECTICUT	6,011	6,482	6,986	7.8%	16.2%
REGION	408,603	425,897	439,578	4.2%	7.6%

2.10 Mode Choice Model

The mode choice model is one of the most important components of the MTA RTF Model. It is responsible for determining the market share for each mode of travel (i.e., automobile, commuter rail, subway, and bus) and the shifts in market share that result from changes to the transportation network. The model predicts each mode's share of the total travel market for each combination of production zone and attraction zone in the region. These predictions are based on the characteristics of the trip makers and on the zone-to-zone characteristics of each mode including in-vehicle travel time, waiting time, fare, and number of transfers.

The mode choice model developed for the MTA RTF Model is a nested logit-type model. Its structure and coefficients are borrowed from the NJ TRANSIT North Jersey Transit Demand Forecasting Model with adjustments for the MTA RTF based on traveler preference research conducted by MVA Consultancy for the LMAS.

The four modes included in the mode choice model are consistent with the four modes used in the network and path-building steps and are:

1. **Automobile:** Motorized trips that drive from origin to destination without using any transit service.

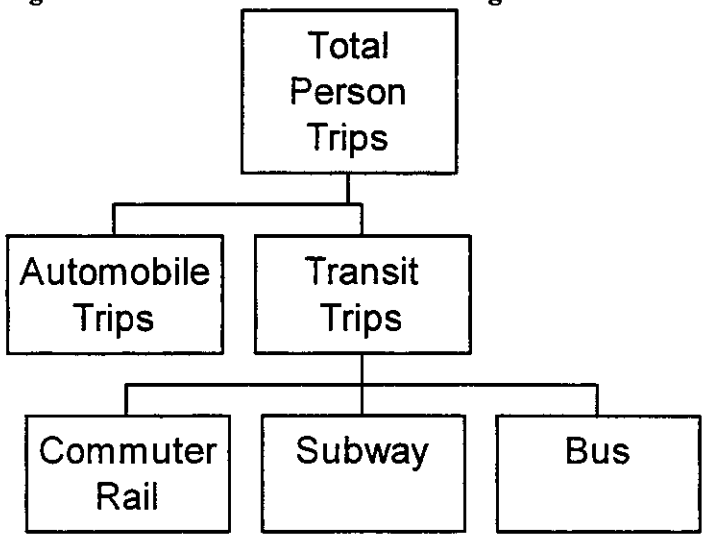
2. **Commuter Rail:** Trips that use commuter rail (e.g., LIRR, Metro-North, or NJ TRANSIT rail during some portion of the trip from origin to destination). As defined in the MTA RTF Model, the commuter rail mode includes bus-to-commuter rail and subway-to-commuter trips.

3. **Subway:** Trips that use the NYCT subway or PATH during some portion of the trip from origin to destination but do *not* use commuter rail (these later trips would be characterized as commuter rail trips). As defined in the MTA RTF Model, the subway mode includes bus-to-subway trips.

4. **Bus:** Trips that use transit but do not use commuter rail or subway during any portion of the trip from origin to destination.

The structure of the modeled modes is shown in Figure 2.8.

Figure 2-8 Mode Choice Model Nesting Structure



A nested logit mode choice model works by computing the "utility" for each of the bottom level choices (i.e., automobile, commuter rail, subway, and bus). This utility represents the total economic "cost" of travel for each mode in terms of time, cost, and other impediments/inducements to travel. It is typically constructed as a linear function of the different components of time and cost as shown below:

$$U_m = (C_1*IVTT_m + C_2*OVTT_m + C_3*WAIT_m + C_4*COST_m + C_5*DATA1_m + \ldots + K_m) * 1/NC_m$$

Where:

U_m = Utility for mode *m*
C_1, C_2, C_3, C_4, C_5 = Calibrated coefficients
$IVTT_m$ = in-vehicle travel time for mode *m*
$OVTT_m$ = out-of-vehicle travel time for mode *m*
$WAIT_m$ = wait time for mode *m*
$COST_m$ = travel cost or fare for mode *m*
$DATA1_m$ ... = other data elements characterizing the mode *m* trip
K_m = mode-specific constant for mode *m*
NC_m = product of the nest coefficients for all upper nests

The utility for an upper level nest (i.e., auto or transit) is computed by taking the log-sum of the lower level nests. For example, the utility for all transit is computed from the utilities for commuter rail, subway, and bus as follows:

$$U_t = NC_t * \ln(\exp(U_c) + \exp(U_s) + \exp(U_b))$$

where:
U_t= Utility for transit
NC_t= Nest coefficient for transit nest

ln() = Natural logarithm
exp() = Exponential function (i.e., e^x)
U_c = Utility for commuter rail
U_s= Utility for subway
U_b= Utility for bus

For any given choice (i.e., auto versus transit or commuter rail versus subway versus bus), the choice is computed using the logit equation:

$$S_m = \frac{e^{U_m}}{\sum_{i=1}^{M} e^{U_i}}$$

where:

S_m = Mode share for mode *m*
U_m = Utility for mode *m*
M = Number of different modes to be chosen among

The basic model structure and coefficients are based on values used in the NJ TRANSIT North Jersey Transit Demand Forecasting Model with adjustments to account for:

1. Research conducted by MVA through a stated preference survey project to determine the preferences of travelers at each commuter rail Manhattan Gateway regarding travel to Lower Manhattan; and

2. Adjustments required to fit the model to explain observed transit travel patterns in the region.

The final model coefficients are presented in Table 2-26.

Table 2-26 Final Mode Choice Coefficients for the MTA RTF Model

Mode	Home-Based Work	Home-Based Other	Non-Home Based
Automobile			
IVTT	-0.04195	-0.00789	-0.00789
Auto Cost (Year 1995 cents)	-0.00315	-0.00059	-0.00059
Commuter Rail			
In-vehicle time – commuter rail (minutes)	-0.03222	-0.02616	-0.02616
In-vehicle time - subway (minutes)	-0.04306	-0.03488	-0.03488
In-vehicle time - bus time (minutes)	-0.04306	-0.03488	-0.03488
Wait time	-0.07733	-0.06278	-0.06278
Fare (Year 1995 cents)	-0.00242	-0.00196	-0.00196
Out-of-vehicle time (minutes)	-0.03544	-0.02878	-0.02878
Transfers (number)	-0.15143	-0.12295	-0.12295
Subway Flag (=1 if subway on path, =0 otherwise)	-0.12888	-0.10464	-0.10464
Bus Flag (=1 if subway on path, =0 otherwise)	-0.12888	-0.10464	-0.10464
Subway			
In-vehicle time (minutes)	-0.04306	-0.03488	-0.03488
Wait time	-0.07733	-0.06278	-0.06278
Fare (Year 1995 cents)	-0.00242	-0.00196	-0.00196
Out-of-Vehicle time (minutes)	-0.03544	-0.02878	-0.02878
Transfers (number)	-0.15143	-0.12295	-0.12295
Bus			
In-vehicle time (minutes)	-0.04306	-0.03488	-0.03488
Wait time	-0.07733	-0.06278	-0.06278
Fare (Year 1995 cents)	-0.00242	-0.00196	-0.00196
Walk time (minutes)	-0.03544	-0.02878	-0.02878
Transfers (number)	-0.15143	-0.12295	-0.12295
Transit Nest Coefficient	0.50000	0.50000	0.50000

Note: All coefficients expressed as equivalent top-nest value. Transit coefficients are divided by the transit nest coefficient prior to computation of the utility function. Mode-specific constants for each alternative were determined during aggregate calibration and are discussed in Section 2.9.1.

2.10.1 Aggregate Calibration

Aggregate calibration is the process of establishing final mode-specific constants so that modeled shares by mode match observed shares. This model has been calibrated for 49 sub-area markets to ensure that the model replicates regional travel patterns. The 49 sub-areas represent the combination of 7 production and 7 attraction areas. These 7 areas are:

- Lower Manhattan (South of Canal)
- Midtown Manhattan (Canal to 60th Street)
- Uptown Manhattan (North of 60th Street)
- Bronx
- Brooklyn
- Queens
- Suburban and Staten Island

Travel in two submarkets (Suburban/Staten Island-to-Lower Manhattan and Suburban/Staten Island-to-Midtown) is further subdivided at the production-end according to the following subdivisions:

- Nassau County
- Western Suffolk County
- Eastern Suffolk County
- Western Westchester County
- Central Westchester County
- Eastern Westchester County
- Northern Westchester County
- Putnam and Dutchess Counties
- Orange and Rockland Counties
- Bridgeport
- Southern Fairfield County
- Northern Fairfield County
- New Haven and Litchfield Counties
- Staten Island

Constants were determined by iteratively running each model (home-based work, home-based other, and non-home-based) and comparing mode split results (trips by mode) for each market segment to market segment summaries from the survey-derived trip tables. The constants are adjusted up or down to improve the comparison between modeled and survey trips by mode and the process is repeated.

2.11 Preparation of AM Peak Period Origin-Destination Trip Tables

The mode choice model estimates the alternative-specific daily production-attraction trip tables stratified by mode and purpose. The next step is to take this information and create a new trip table suitable for assignment to the transit networks. Three conversions are required:

- **Convert the production-attraction trip tables into origin-destination format.** In other words, convert the trip table so that each row represents trip origins and each column represents trip destinations—this change allows the directionality of travel to be properly represented.

- **Select those trips that occur in the AM Peak Period.** The MTA transit networks represent transit services occurring in the peak hour. The selection of just those trips occurring in the peak period means that the assignment considers just those trips that would likely see the service represented in the network.

- **Add New Jersey-Related Travel.** Trans-Hudson travel is added to the trip table using results from the 1990 Base and 2020 No-Build versions of NJ TRANSIT's North Jersey Transit Demand (NJTDFM) Forecasting Model. This was accomplished by converting the NJTDFM representation of New York zones into the equivalent MTA RTF zone. The New Jersey zones were converted into the appropriate external station depending on where each trip crosses the Hudson River. The following external stations were defined:

    - Hudson River Tunnels approaching Penn Station
    - Lincoln Tunnel approaching the Port Authority Bus Terminal
    - George Washington Bridge approaching the George Washington Bridge Bus Terminal
    - PATH North Tube
    - PATH South Tube
    - New Jersey Ferry to Midtown
    - New Jersey Ferry to the World Financial Center

The approach for converting a production-attraction trip table to an origin-destination trip table involves developing and applying a series of multiplicative factors that represent the amount of daily travel occurring in the peak. Separate factors are applied for trips traveling from home (i.e., production-to-attraction) and the transpose (i.e., attraction-to-production). These factors are based on the 1989 MTA Comprehensive Telephone Travel Survey and are shown in Table 2-27.

The AM origin-destination trip tables are computed by multiplying the all-day production-attraction trip table by the production-to-attraction factor and the transpose of the all-day trip table by the attraction-to-production factor. As such, the sum of the production-to-attraction and the attraction-to-production factors represents the fraction of daily travel occurring in the AM Peak. None of the summed factors exceeds 0.5 meaning that 50 percent or less of the daily travel occurs in the AM Peak. In several cases, the sum of the HBW factors approaches or equals 0.5, meaning that 50 percent of the HBW trips occur in the AM Peak Period. This factor is relatively high and is caused by the fact that commuter trips in the afternoon are more likely to make intermediate stops. Thus the afternoon trip home is more likely to consist of a non-home-based trip (e.g., work-to-shop) and a home-based other trip (e.g., shop-to-home) than a single HBW trip. Accordingly, a higher percentage of the HBW trips is expected to occur in the AM Peak.

Table 2-27 Fraction of Travel Occurring in the AM Peak Period

		Production-to- Attraction	Attraction-to-Production
Commuter Rail	HBW	0.494	0.003
	HBO	0.314	0.002
	NHB	0.207	
Subway	HBW	0.479	0.005
	HBO	0.269	0.011
	NHB	0.127	
Bus	HBW	0.492	0.007
	HBO	0.265	0.003
	NHB	0.144	

2.12 AM Peak Period Assignment Procedures

Assignment is performed using the AM peak period origin-destination trip tables developed in the previous step and the TRANSCAD TASSIGN Procedure. This assignment procedure uses a capacity-constrained user-equilibrium assignment approach to assign trips to the transit network. Assignment is conducted in four phases:

1. AM Peak Period Subway Trips
2. AM Peak Period Commuter Rail Trips (trips from Metro-North Territory)
3. AM Peak Period Commuter Rail Trips (trips from LIRR Territory)
4. AM Peak Period Bus Trips

Following each phase of the assignment, the remaining capacity on each link is computed prior to beginning the assignment of the next mode. Accordingly, the commuter rail assignments are performed based on the capacity limitations imposed by the prior assignment of subway trips. Likewise, the assignment of bus trips is constrained by the prior assignment of both subway and commuter rail trips.

3. DEFINITION OF ALTERNATIVES

The ridership model described in Chapter 2 has been used to estimate the ridership implications of different possible configurations of LIRR service. This chapter describes each of the alternative LIRR service scenarios studied and presented in this report.

3.1 Year 1995 Base (NB95)

The Year 1995 Base (designated with the code "NB95" in the tables summarizing the results) represents the highway and transit networks as they existed in 1995 with the demand for travel as it existed in 1995. The results of this scenario are used to both:

- Validate the performance of the model to confirm that it appropriately represents observed conditions; and
- Provide a basis for comparison that shows how ridership is expected to change between the present and the forecast years.

Specific assumptions regarding the LIRR service in 1995 are provided in Tables 3-1 and 3-2.

3.2 Year 2010 and Year 2020 No-Build (NB13 and NB23)

The Year 2010 and 2020 No-Build Scenarios represent conditions given either 2010 or 2020 levels of demand and the future-year No-Build Network. The No-Build network is based on existing conditions with committed changes that are assumed to occur between 1995 and 2010/2020 and are independent of the decision to build or not build the East Side Access Project. These runs are designated as NB13 (2010 No-Build) and NB23 (2020 No-Build). The principal differences between the 1995 and future-year No-Build networks are as follows:

1. **Fare Policy.** As indicated in Chapter 2, the future year fare policy is slightly different from the 1995 fare policy. In constant year dollars, the fares on the LIRR are expected to decline by between 3 and 4 percent between 1995 and either 2010 or 2020. This is consistent with current MTA fare policy that fares would increase in November 1995 and would not increase again until the Year 2000. Following that period, the MTA has assumed for its Long Range Planning Framework projects that fare would rise proportionately with the Consumer Price Index.

   The no-build fare policy assumes that subway and bus fares would rise proportionately with inflation between 1995 and 2020. The free Metro-Card bus-to-subway and bus-to-bus transfers that have been recently implemented are assumed available in 2010 and 2020.

2. **LIRR Service.** The future year No-Build operating scenario is similar to the 1995 service plan but assumes that the LIRR is able to increase the AM Peak Hour Capacity of Penn Station from 36 trains per hour today to 42 trains per hour in the future. The LIRR will utilize this additional capacity to operate 6 new peak hour dual mode trains from its non-electrified territory directly into New York Penn Station. A summary of the assumed LIRR services in the 2020 No-Build is provided in Tables 3-3 and 3-4.

3. **Subway Service.** The future year No-Build includes the construction and operation of NYCT's 63rd Street Tunnel Connection to the Queens Boulevard Line. Direct service from 179th Street to the 63rd Street Tunnel is provided in the No-Build Scenario.

4. **Metro-North Changes.** The future year No-Build also includes minor changes to the Metro-North Network including the extension of the Harlem Line to Wassaic and the Secaucus Transfer in New Jersey which will allow direct transfers from the MNR Port Jervis and Spring Valley Lines to NJ TRANSIT's Northeast Corridor Service to Penn Station.

5. **Bus Service Changes.** The 2010 and 2020 No-Build Networks include the MTA's representation of expected future year bus services.

3.3 Year 2010 and Year 2020 Transportation Systems Management (T310 and TSM3)

The Year 2010 and 2020 Transportation Systems Management (TSM) Alternative represents a low-capital cost scenario for purposes of assessing the effectiveness of the Build Alternatives. The TSM alternatives are based on the scenarios developed for the LIRR ESA MIS project and are designated as T310 (2010 TSM) and TSM3 (2020 TSM). They are similar to the 2010/2020 No-Build Scenarios with the following additional system enhancements:

1. **Additional LIRR Train Capacity.** Additional capacity was assumed for selected trains on the LIRR system by assuming that selected trains would operate with a full 11 or 12 car consist. These changes are as follows.
   - 2,400 additional seats/hour on Babylon Branch
   - 1,680 additional seats/hour on Port Washington Branch
   - 960 additional seats/hour on Long Beach Branch
   - 720 additional seats/hour on Far Rockaway Branch

2. **Increased LIRR service to Hunterspoint Avenue and Long Island City.** Additional LIRR service is provided to Hunterspoint Avenue and Long Island City as follows:
   - One additional peak hour train from Port Jefferson to Hunterspoint Avenue
   - One additional peak hour train from Port Jefferson to Hunterspoint Avenue continuing to Long Island City
   - One additional peak hour train from Yaphank to Hunterspoint Avenue
   - One additional peak hour train from Oyster Bay to Hunterspoint Avenue
   - One additional peak hour train from Pacthogue to Hunterspoint Avenue
   - One additional peak hour train from Speonk to Long Island City

3. **Contra-Flow Lanes on the Long Island Expressway.** The existing contra-flow bus lane on the Long Island Expressway is assumed to be extended to 102nd Street in Queens (near the interchange with the Grand Central Parkway). The facility improves the AM Peak Hour travel time for the Queens Express bus service to Manhattan as follows:
   - Entering the LIE at Main Street: X51 saves 7 minutes
   - Entering the LIE at Van Wyck Expressway: QM2, QM2A, and QM3 save 7 minutes
   - Entering the LIE at Woodhaven Avenue: BQM1, X63, X64, X68, QM1, QM1A, QM1Aext, QM4, QM10, QM11, QM12, QM15, QM16, QM17, QM18, QM21, QM23, QM24, and QM24W save 7 minutes
   - Entering the LIE at 21st Street (Long Island City): QM22 saves 2 minutes

   For purposes of modeling, the express bus time savings quoted above are divided by two to account for the facto that the contra-flow lane operates in the AM peak inbound direction only. No benefit accrues to travelers in the PM peak.

3.4 Year 2010 and Year 2020 Build (G310 and GCT3)

The Year 2010 and 2020 Build Scenarios represent the scenario in which the LIRR East Side Access to GCT is constructed. These alternatives are designated as G310 (Year 2010 Build) and GCT3 (Year 2020 Build). Each scenario is identical to the No-Build Scenarios with the exception that:

- The LIRR operates 24 peak hour trains to Grand Central Terminal; and
- AM Peak Hour Trains operating into Penn Station are reduced from 42 (in the 2020 no-build) to 37 trains (in the 2020 build).
- Local trains to Penn Station (i.e., those previously making a station stop at Jamaica) are assumed to make a stop a new station located at Sunnyside.

A summary of the build train operating plan is presented in Tables 3-5 and 3-6.

Table 3-1 Year 1995 Base AM Peak Hour In-Bound LIRR Service to each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	501	4	2,640	660																		4	2,640	660
	502	1	1,200	1,200																		1	1,200	1,200
	503	2	1,200	600																		2	1,200	600
	504	1	2,160	2,160																		1	2,160	2,160
	Total	8	7,200	900	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	8	7,200	900
Port Jefferson	507	2	2,640	1,320					510	1	1,200	1,200	505	1	720	720						4	4,560	1,140
	508	1	1,200	1,200									506	2	2,160	1,080						3	3,360	1,120
	509	2	2,880	1,440																		2	2,880	1,440
	Total	5	6,720	1,344	Total	0	0		Total	1	1,200	1,200	Total	3	2,880	960	Total	0	0		Total	9	10,800	1,200
Ronkonkoma	511	1	1,440	1,440					514	1	720	720										2	2,160	1,080
	512	1	1,440	1,440																		1	1,440	1,440
	513	1	1,200	1,200																		1	1,200	1,200
	Total	3	4,080	1,360	Total	0	0		Total	1	720	720	Total	0	0		Total	0	0		Total	4	4,800	1,200
Oyster Bay	517	1	1,200	1,200									516	1	600	600	515	1	840	840		3	2,640	880
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	600	600	Total	1	840	840	Total	3	2,640	880
Hempstead	519	2	960	480					518	2	1,680	840										4	2,640	660
	Total	2	960	480	Total	0	0		Total	2	1,680	840	Total	0	0		Total	0	0		Total	4	2,640	660
West Hempstead	521	1	960	960					520	1	480	480										2	1,440	720
	Total	1	960	960	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	2	1,440	720
Far Rockaway	523	2	2,160	1,080					522	2	1,440	720										4	3,600	900
	524	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,360	1,120	Total	0	0		Total	2	1,440	720	Total	0	0		Total	0	0		Total	5	4,800	960
Long Beach	525	1	1,440	1,440					528	1	480	480										2	1,920	960
	526	1	960	960																		1	960	960
	527	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	4	4,080	1,020
Babylon	530	2	1,200	600					529	4	3,120	780										6	4,320	720
	531	8	9,120	1,140																		8	9,120	1,140
	Total	10	10,320	1,032	Total	0	0		Total	4	3,120	780	Total	0	0		Total	0	0		Total	14	13,440	960
Montauk	534	1	1,200	1,200									533	1	720	720	532	1	600	600	532	3	2,520	840
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	720	720	Total	1	600	600	Total	3	2,520	840
GRAND TOTAL		37	39,600	1,070		0	0			12	9,120	760		5	4,200	840		2	1,440	720		56	54,360	971

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-2 Year 1995 Base AM Peak Hour Out-Bound LIRR Service from each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	699	2	2,400	1,200																		2	2,400	1,200
	678	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Port Jefferson	680/682	1	1,200	1,200																		1	1,200	1,200
	696	3	1,200	400																		3	1,200	400
	Total	4	2,400	600	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	4	2,400	600
Ronkonkoma	693	1	1,200	1,200																		1	1,200	1,200
	691/694	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	2	2,400	1,200
Oyster Bay									677/698	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Hempstead									692	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
West Hempstead									690	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Far Rockaway									681	1	1,200	1,200										1	1,200	1,200
									683	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	2	2,400	1,200
Long Beach									684	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Babylon	685	1	1,200	1,200																		1	1,200	1,200
	686	1	1,200	1,200																		1	1,200	1,200
	687	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Montauk	679/688	1	1,200	1,200																	532	1	1,200	1,200
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	1	1,200	1,200
GRAND TOTAL		13	13,200	1,015		0	0			6	7,200	1,200		0	0			0	0			19	20,400	1,074

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-3 Year 2010/2020 No-Build AM Peak Hour In-Bound LIRR Service to each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	501	4	2,640	660																		4	2,640	660
	502	1	1,200	1,200																		1	1,200	1,200
	503	2	1,200	600																		2	1,200	600
	504	1	2,160	2,160																		1	2,160	2,160
	Total	8	7,200	900	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	8	7,200	900
Port Jefferson	505	1	980	980					510	1	1,200	1,200	706	1	720	720						3	2,900	967
	506	2	1,260	630																		2	1,260	630
	507	2	2,640	1,320																		2	2,640	1,320
	508	1	1,200	1,200																		1	1,200	1,200
	509	2	2,880	1,440																		2	2,880	1,440
	Total	6	6,080	1,013	Total	0	0		Total	1	1,200	1,200	Total	1	720	720	Total	0	0		Total	8	8,000	1,000
Ronkonkoma	511	1	1,440	1,440					514	1	720	720	713	1	1,200	1,200						3	3,360	1,120
	512	1	1,440	1,440																		1	1,440	1,440
	513	1	1,200	1,200																		1	1,200	1,200
	Total	3	4,080	1,360	Total	0	0		Total	1	720	720	Total	1	1,200	1,200	Total	0	0		Total	5	6,000	1,200
Oyster Bay	515	1	560	560									716	1	600	600						2	1,160	580
	517	1	1,200	1,200																		1	1,200	1,200
	Total	2	1,760	880	Total	0	0		Total	0	0		Total	1	600	600	Total	0	0		Total	3	2,360	787
Hempstead	519	2	960	480					518	2	1,680	840										4	2,640	660
	Total	2	960	480	Total	0	0		Total	2	1,680	840	Total	0	0		Total	0	0		Total	4	2,640	660
West Hempstead	521	1	960	960					520	1	480	480										2	1,440	720
	Total	1	960	960	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	2	1,440	720
Far Rockaway	523	2	2,160	1,080					522	2	1,440	720										4	3,600	900
	524	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,360	1,120	Total	0	0		Total	2	1,440	720	Total	0	0		Total	0	0		Total	5	4,800	960
Long Beach	525	1	1,440	1,440					528	1	480	480										2	1,920	960
	526	1	960	960																		1	960	960
	527	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	4	4,080	1,020
Babylon	530	2	2,400	1,200					529	8	3,120	390										10	5,520	552
	531	8	9,120	1,140																		8	9,120	1,140
	Total	10	11,520	1,152	Total	0	0		Total	8	3,120	390	Total	0	0		Total	0	0		Total	18	14,640	813
Montauk	533	1	560	560									734	1	600	600	532	1	600	600	532	3	1,760	587
	534	1	1,200	1,200																		1	1,200	1,200
	535	1	840	840																		1	840	840
	Total	3	2,600	867	Total	0	0		Total	0	0		Total	1	600	600	Total	1	600	600	Total	5	3,800	760
GRAND TOTAL		41	42,120	1,027		0	0			16	9,120	570		4	3,120	780		1	600	600		62	54,960	886

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-4 Year 2010/2020 No-Build AM Peak Hour Out-Bound LIRR Service from each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	699	1	2,400	2,400																		1	2,400	2,400
	678	1	1,200	1,200																		1	1,200	1,200
	Total	2	3,600	1,800	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	2	3,600	1,800
Port Jefferson	680/682	1	1,200	1,200																		1	1,200	1,200
	696	2	1,200	600																		2	1,200	600
	Total	3	2,400	800	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	2,400	800
Ronkonkoma	693	1	1,200	1,200																		1	1,200	1,200
	691/694	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	2	2,400	1,200
Oyster Bay									677/698	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Hempstead									692	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
West Hempstead									690	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Far Rockaway									681	1	1,200	1,200										1	1,200	1,200
									683	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	2	2,400	1,200
Long Beach									684	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Babylon	685	1	1,200	1,200																		1	1,200	1,200
	686	1	1,200	1,200																		1	1,200	1,200
	687	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Montauk	679/688	1	1,200	1,200																		1	1,200	1,200
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	1	1,200	1,200
GRAND TOTAL		11	13,200	1,200		0	0			6	7,200	1,200		0	0			0	0			17	20,400	1,200

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-5 Year 2010/2020 Build AM Peak Hour In-Bound LIRR Service to each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	501	3	1,980	660	701	2	2,400	1,200														5	4,380	876
	502	1	1,200	1,200	702	1	1,200	1,200														2	2,400	1,200
	503	1	1,200	1,200	703	1	1,200	1,200														2	2,400	1,200
	504	1	1,200	1,200	704	2	2,400	1,200														3	3,600	1,200
	Total	6	5,580	930	Total	6	7,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	12	12,780	1,065
Port Jefferson	505	1	980	980	707	3	4,320	1,440					706	1	720	720						5	6,020	1,204
	506	2	1,920	960	709	2	2,880	1,440														4	4,800	1,200
	508	1	1,200	1,200	710	1	1,440	1,440														2	2,640	1,320
	509	2	2,880	1,440																		2	2,880	1,440
	Total	6	6,980	1,163	Total	6	8,640	1,440	Total	0	0		Total	1	720	720	Total	0	0		Total	13	16,340	1,257
Ronkonkoma	511	1	1,440	1,440	712	2	2,880	1,440														3	4,320	1,440
	513	1	1,200	1,200	713	2	2,880	1,440														3	4,080	1,360
	514	1	720	720																		1	720	720
	535	1	840	840																		1	840	840
	Total	3	3,360	1,120	Total	4	5,760	1,440	Total	0	0		Total	0	0		Total	0	0		Total	7	9,120	1,303
Oyster Bay	515	1	960	960									716	1	600	600						2	1,560	780
	Total	1	960	960	Total	0	0		Total	0	0		Total	1	600	600	Total	0	0		Total	2	1,560	780
Hempstead	519	2	960	480	719	2	2,880	1,440	518	2	1,920	960										6	5,760	960
	Total	2	960	480	Total	2	2,880	1,440	Total	2	1,920	960	Total	0	0		Total	0	0		Total	6	5,760	960
West Hempstead	521	1	960	960					520	1	480	480										2	1,440	720
	Total	1	960	960	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	2	1,440	720
Far Rockaway	523	1	1,080	1,080	723	1	1,440	1,440	522	2	1,440	720										4	3,960	990
	Total	1	1,080	1,080	Total	1	1,440	1,440	Total	2	1,440	720	Total	0	0		Total	0	0		Total	4	3,960	990
Long Beach	524	1	1,200	1,200	727	1	1,440	1,440	528	1	480	480										3	3,120	1,040
	525	1	1,440	1,440																		1	1,440	1,440
	526	1	960	960																		1	960	960
	527	1	1,200	1,200																		1	1,200	1,200
	Total	4	4,800	1,200	Total	1	1,440	1,440	Total	1	480	480	Total	0	0		Total	0	0		Total	6	6,720	1,120
Babylon	530	2	1,920	960	730	2	2,880	1,440	529	4	2,160	540										8	6,960	870
	531	8	9,120	1,140	731	2	2,880	1,440														10	12,000	1,200
	Total	10	11,040	1,104	Total	4	5,760	1,440	Total	4	2,160	540	Total	0	0		Total	0	0		Total	18	18,960	1,053
Montauk	533	1	960	960									734	1	600	600	532	1	600	600	532	3	2,160	720
	534	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,160	1,080	Total	0	0		Total	0	0		Total	1	600	600	Total	1	600	600	Total	4	3,360	840
GRAND TOTAL		36	37,880	1,052		24	33,120	1,380		10	6,480	648		3	1,920	640		1	600	600		74	80,000	1,081

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-6 Year 2010/2020 No-Build AM Peak Hour Out-Bound LIRR Service from each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	899	1	1,200	1,200	873	4	4,800	1,200														5	6,000	1,200
	878	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	4	4,800	1,200	Total	0	0		Total	0	0		Total	0	0		Total	6	7,200	1,200
Port Jefferson	880/882	1	1,200	1,200	874	3	4,320	1,440														4	5,520	1,380
	896	2	2,880	1,440																		2	2,880	1,440
	Total	3	4,080	1,360	Total	3	4,320	1,440	Total	0	0		Total	0	0		Total	0	0		Total	6	8,400	1,400
Ronkonkoma	893	1	1,200	1,200	894	1	1,200	1,200														2	2,400	1,200
	891/894	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Oyster Bay									877/898	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Hempstead	876	1	1,440	1,440	875	1	1,440	1,440	892	1	960	960										3	3,840	1,280
	Total	1	1,440	1,440	Total	1	1,440	1,440	Total	1	960	960	Total	0	0		Total	0	0		Total	3	3,840	1,280
West Hempstead									890	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Far Rockaway									881	1	1,200	1,200										1	1,200	1,200
									883	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	2	2,400	1,200
Long Beach									884	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Babylon	885	1	1,440	1,440	827	3	4,320	1,440														4	5,760	1,440
	886	1	1,200	1,200																		1	1,200	1,200
	887	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,840	1,280	Total	3	4,320	1,440	Total	0	0		Total	0	0		Total	0	0		Total	6	8,160	1,360
Montauk	879/888	1	1,200	1,200																	532	1	1,200	1,200
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	1	1,200	1,200
GRAND TOTAL		12	15,360	1,280		12	16,080	1,340		6	6,960	1,160		0	0			0	0			30	38,400	1,280

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

4. YEAR 2010 FORECAST RESULTS

This chapter presents the results of the ridership forecasting models for the 2010 forecast year. Similar results for the 2020 forecast year are presented in Chapter 5. The results presented in this chapter include the impacts of the build and TSM projects on total transit and LIRR ridership (linked trip impacts) and on ridership to each LIRR Manhattan terminal. The difference between total LIRR ridership to GCT and the number of new LIRR linked trips is the number of existing riders diverted from Penn Station or some other terminal to the new service to GCT.

This chapter also presents ridership forecasting results that are used in the development of the draft environmental impact statement. This information includes the distribution of LIRR-to-GCT passengers to different Manhattan Zones for purposes of evaluating pedestrian congestion; vehicle-miles of travel impact, and estimates of parking demand for each station.

4.1 Year 2010 Linked Trip Impacts

One of the best indicators of the ability of a transit project to attract new customers and increase market share is the number of linked trips by mode. Linked trips by mode represent the region-wide total travel from each origin to each destination traveling on each mode. The linked trip tables are a direct outcome of the mode choice model and therefore the modes that can be reported are identical to the modes defined in the mode choice model. These modes are:

- Automobile
- Commuter Rail (including commuter rail/subway trips and commuter rail/bus trips)
- Subway (including subway/bus trips)
- Bus

In the case of the transit mode, each trip is counted once, no matter how many transfers are made or how many transit vehicles are boarded. Accordingly, this measure is directly related to the total travel by transit and provides a realistic basis for comparing alternatives the force many transfers to alternatives that force few transfers.

Table 4-1 presents a comparison of the Year 2010 Weekday (All-Day) Linked Trips by Mode for each of the 2010 scenarios discussed in Chapter 3. This table is stratified by trip purpose as follows:

- HBW – Home-Based Work
- HBO – Home-Based Other
- NHB – Non-Home-Based

Table 4-1 also presents the total (all purposes) incremental linked trips as compared to the No-Build Alternative (NB13). As this table shows, the total number of incremental linked trips for all modes of travel is very nearly equal to zero. This is a result of the fact that a fixed person trip table is used in this travel demand forecasting model and that total travel is constrained to the same number of person trips in any given year.

The number of incremental Year 2010 Weekday Automobile Trips shows that the TSM Alternative is able to reduce automobile travel by 3,400 trips per weekday and the LIRR-to-GCT Alternative is able to reduce Automobile Travel by 14,200 trips per weekday. Conversely, the model results also show that the TSM and LIRR-to-GCT Alternatives add 3,400 and 14,200 new weekday transit riders. This is the "New

Riders-as compared to No-Build" statistic included in the FTA Section 5309 *Annual Report on New Starts*. The number of New Riders as Compared to TSM is the difference between these two figures or 10,800 Daily New Riders.

Table 4-1 also presents an estimate of the number of commuter rail linked trips predicted by the mode choice model. This statistic is similar, but not identical, to the total number of LIRR and MNR trips in the region. It is not identical to the assigned commuter rail volumes since commuter rail trips may be assigned to non-commuter rail services and vice-versa in the capacity-constrained assignment. Nevertheless, the number of new commuter rail trips (build versus no-build) predicted by the mode choice model provides an indication of the expected increase in daily LIRR daily trips. In 2010, the mode choice model predicts 29,200 additional daily LIRR linked trips in the LIRR-to-GCT build condition than in the No-Build. In addition, the assignment procedures assign an additional 3,900 non-commuter rail trips in the Build alternative due to the increased availability of LIRR capacity. The number of additional daily LIRR trips is presented in Table 4-2 and is equal to 33,000 additional daily LIRR trips in the Build Alternative as compared to the No-Build.

Table 4-1 Year 1995 and 2010 Weekday (All-Day) Linked Person Trips by Mode and Purpose

		1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
HBW					
	Auto	4,455,549	4,898,639	4,896,172	4,890,530
	Commuter Rail	285,682	368,126	371,172	386,916
	Subway	1,794,233	2,185,990	2,181,888	2,176,926
	Bus	455,831	443,267	446,791	441,652
	Total	6,991,295	7,896,022	7,896,023	7,896,024
HBO					
	Auto	6,450,701	6,763,135	6,762,488	6,757,846
	Commuter Rail	147,258	167,406	169,184	174,621
	Subway	1,065,638	1,198,240	1,197,107	1,197,121
	Bus	758,066	734,394	734,396	733,587
	Total	8,421,663	8,863,175	8,863,176	8,863,175
NHB					
	Auto	1,641,898	1,704,763	1,704,469	1,703,962
	Commuter Rail	57,712	59,383	60,296	62,547
	Subway	489,708	546,901	546,344	544,837
	Bus	128,210	118,854	118,791	118,555
	Total	2,317,528	2,429,901	2,429,901	2,429,901
TOTAL					
	Auto	12,548,148	13,366,537	13,363,129	13,352,338
	Commuter Rail	490,653	594,915	600,652	624,084
	Subway	3,349,579	3,931,131	3,925,339	3,918,884
	Bus	1,342,107	1,296,515	1,299,979	1,293,794
	Total	17,730,486	19,189,098	19,189,099	19,189,100
INCREMENTAL (versus NB13) TOTAL					
	Auto		-	(3,408)	(14,199)
	Commuter Rail		-	5,738	29,169
	Subway		-	(5,793)	(12,247)
	Bus		-	3,464	(2,722)
	Total		-	1	1

Note: Totals may not add due to rounding.

Table 4-2 2010 Incremental (Versus No-Build) Daily LIRR Trips

	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
Commuter Rail Mode	-	5,738	29,169
Other Modes Assigned to Rail	-	(1,027)	3,876
Total	-	4,711	33,045

4.2 Year 2010 Station Utilization

Another important result of the ridership forecasting process is the number of trips utilizing key facilities that will be affected by the project. This statistic is equivalent to a number of riders that could be counted boarding or alighting at each station or the number of persons on-board trains as they travel to or from each terminal station.

Table 4-3 presents AM Peak 4-Hour (6-10 AM) and estimated daily LIRR riders arriving at each terminal. Table 4-4 and Table 4-5 present similar information for LIRR riders departing each terminal and the sum of arrivals plus departures, respectively.

The first two columns of each table represent passenger counts taken by the LIRR in 1990 and 1995 and are used to confirm the accuracy of the model results. The counts can be compared to the column labeled "NB95" which presents the modeled estimates of Year 1995 LIRR activity at each terminal. As this table shows, the model does an excellent job of representing total (all terminals) daily 1995 LIRR arrivals and departures. The model also does reasonably well in replicating the distribution of activity among individual terminals and travel occurring in the AM Peak 4-Hour Period as a fraction of daily activity.

The next three columns represent forecasted model activity at each terminal for the 2010 No-Build (NB13), the 2010 Transportation Systems Management (T310), and 2010 LIRR-to-GCT Build (G310) Alternatives. As shown in these tables, total daily passenger activity (arrivals plus departures) for all LIRR terminals is forecasted to increase from 245,900 daily arriving and departing passengers in 1995 to 288,600 in the 2010 No-Build, an increase of 17 percent. The TSM alternative reduces this to 285,400 daily arriving and departing passengers. This decline is largely due to substantial improvements to bus operations on the Long Island Expressway that attracts riders away from the LIRR and to express bus services.

The 2010 LIRR-to-GCT alternative (G310) increases total (all terminals) daily LIRR arrivals and departures to 329,700, an increase of 41,100 trips (14.3 percent) over the 2010 No-Build. Daily arrivals and departures at Grand Central Terminal will be 151,600 and the new Sunnyside Station will attract 5,100 daily riders. Activity at Penn Station will drop from 259,000 to 151,200, a drop of 107,800 (-42 percent).

The fact that LIRR terminal volumes increase by 41,100 while total LIRR volumes increases by only 33,000 is caused by a greater percentage of passengers utilizing terminal stations in the LIRR-to-GCT Build than in the No-Build. Key examples of this phenomenon are as follows:

- The addition of Sunnyside Station results in a drop of 2,600 daily passengers at Woodside. In effect demand is shifted from LIRR line stations to one of the terminal stations
- About least 1,600 daily reverse peak trips are made between Penn Station and Sunnyside. Each such trip results in *two* arrivals or departures at the terminal stations.
- About 1,000 more trips make a rail-to-rail transfer at a terminal station in the Build Case than in the No-Build. Each such trip results in *two* arrivals or departures at the terminal stations.
- The service plan used to simulate the impact of LIRR service to GCT results in a modest drop in LIRR volumes to other non-terminal stations of approximately 1,200 intra-Long Island trips
- Approximately 1,800 trips are lost due to different peak period-to-daily factors being used at Hunterspoint and Flatbush Avenue represent the low (or non-existent) peak period utilization at these stations.

Table 4-3 Year 1995 and 2010 AM Peak and All-Day LIRR Arrivals by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
AM Peak (6-10 AM)						
Penn Station	86,950	86,630	86,851	103,856	100,348	58,154
Grand Central	0	0	0	0	0	62,334
Hunterspoint Ave	3,457	2,890	3,279	3,260	4,682	514
Long Island City	195	240	137	44	131	40
Flatbush Ave	12,942	11,670	10,610	11,374	12,275	9,911
Sunnyside	0	0	0	0	0	2,070
Total	103,544	101,430	100,878	118,533	117,435	133,024
All-Day						
Penn Station	106,270	107,570	109,212	130,162	126,328	75,987
Grand Central	0	0	0	0	0	76,194
Hunterspoint Ave	3,457	2,890	3,279	3,260	4,682	514
Long Island City	195	240	136	43	130	40
Flatbush Ave	13,466	14,650	12,721	13,394	14,400	11,744
Sunnyside	0	0	0	0	0	2,568
Total	123,388	125,350	125,349	146,859	145,539	167,047

Table 4-4 Year 1995 and 2010 AM Peak and All-Day LIRR Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
AM Peak (6-10 AM)						
Penn Station	2,930	3,000	4,082	4,522	4,837	5,115
Grand Central	0	0	0	0	0	1,108
Hunterspoint Ave	0	0	0	0	0	0
Long Island City	0	0	0	0	0	0
Flatbush Ave	475	1,290	648	480	469	483
Sunnyside	0	0	0	0	0	68
Total	4,290	4,290	4,731	5,001	5,306	6,774
All-Day						
Penn Station	107,410	106,680	108,120	128,860	125,064	75,227
Grand Central	0	0	0	0	0	75,432
Hunterspoint Ave	2,440	2,230	2,525	2,510	3,605	396
Long Island City	98	110	63	20	60	18
Flatbush Ave	9,959	11,300	9,795	10,313	11,088	9,043
Sunnyside	0	0	0	0	0	2,542
Total	119,907	120,320	120,503	141,703	139,817	162,659

Table 4-5 Year 1995 and 2010 AM Peak and All-Day LIRR Arrivals+Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
AM Peak (6-10 AM)						
Penn Station	89,880	89,630	90,934	108,378	105,185	63,269
Grand Central	0	0	0	0	0	63,442
Hunterspoint Ave	3,457	2,890	3,279	3,260	4,682	514
Long Island City	195	240	137	44	131	40
Flatbush Ave	13,417	12,960	11,258	11,853	12,744	10,394
Sunnyside	0	0	0	0	0	2,138
Total	106,949	105,720	105,609	123,534	122,741	139,798
All-Day						
Penn Station	213,680	214,250	217,332	259,023	251,392	151,214
Grand Central	0	0	0	0	0	151,626
Hunterspoint Ave	5,897	5,120	5,805	5,769	8,287	911
Long Island City	293	350	199	63	189	58
Flatbush Ave	23,425	25,950	22,517	23,707	25,488	20,788
Sunnyside	0	0	0	0	0	5,110
Total	243,295	245,670	245,852	288,562	285,356	329,706

4.3 Year 2010 Travel Time Savings

Travel time savings is one of the measures used in the Federal Transit Administration's (FTA) Section 5309 Annual Report on New Starts. This computation is performed on each zone-to-zone interchange using matrix computation procedures developed by KPMG for the FTA. The results of the travel time savings computation is presented in Table 4-6. In 2010, the build alternative will save 6.8 million hours annually as compared to the No-Build Alternative

Table 4-6 Year 2010 Weekday and Annual Travel Time Savings

		2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
WEEKDAY PERSON-HOURS				
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	3,270	25,997
	In-Vehicle Time	0	2,984	(3,812)
	Total	0	6,254	22,185
TT Savings for New Riders				
	Out-of-Vehicle Time	0	205	2,369
	In-Vehicle Time	0	(39)	(249)
	Total	0	166	2,120
TT Savings for ALL				
	Out-of-Vehicle Time	0	3,475	28,366
	In-Vehicle Time	0	2,945	(4,061)
	Total	0	6,420	24,305
ANNUAL PERSON-HOURS				
Days/Year		282	282	282
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	922,140	7,331,154
	In-Vehicle Time	0	841,488	(1,074,984)
	Total	0	1,763,628	6,256,170
TT Savings for New Riders				
	Out-of-Vehicle Time	0	57,810	668,058
	In-Vehicle Time	0	(10,998)	(70,218)
	Total	0	46,812	597,840
TT Savings for ALL				
	Out-of-Vehicle Time	0	979,950	7,999,212
	In-Vehicle Time	0	830,490	(1,145,202)
	Total	0	1,810,440	6,854,010

4.4 Year 2010 Distribution of Terminal Station Passengers

Table 4-7 presents the distribution of arriving passengers at Penn Station, Grand Central Terminal and Sunnyside Station. This table shows the number of arriving passengers:

- Walking to each nearby zone
- Transferring to different subway lines
- Transferring to nearby bus services
- Transferring to other rail services at the same terminal.

Table 4-7 Year 2010 AM Peak Period Distribution of Arriving LIRR Passengers by Terminal

		1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
PENN STATION					
	Walk	50,793	58,837	56,868	31,397
	Transfer to Subway				
	- A/C/E SB	7,791	8,487	8,149	8,015
	- A/C/E NB	11,448	17,407	16,864	3,765
	- 1/2/3/9 SB	10,077	12,354	11,838	10,713
	- 1/2/3/9 NB	1,834	2,140	2,129	1,944
	- B/D/F/Q SB	1,681	1,586	1,536	1,313
	- B/D/F/Q NB	1,568	1,069	932	-
	- N/R SB	-	763	748	273
	- N/R NB	-	-	-	-
	Total Transfer to Subway	34,399	43,806	42,196	26,023
	Transfer to Bus	223	265	263	8
	Transfer to Other Rail	1,436	948	1,021	726
	Total	86,851	103,856	100,348	58,154
GRAND CENTRAL					
	Walk				51,813
	Transfer to Subway				
	- 4/5 SB				4,223
	- 6 SB				810
	- 4/5 NB				683
	- 6 NB				1,634
	- 7 EB				4
	- 7 WB				21
	- S				-
	Total Transfer to Subway	-	-	-	7,375
	Transfer to Bus				2,556
	Transfer to Other Rail				589
	Total	-	-	-	62,333
SUNNYSIDE					
	Walk				1,115
	Transfer to Subway				
	- 7				169
	- F/R				540
	- E				5
	- N				29
	Total Transfer to Subway	-	-	-	743
	Transfer to Bus				212
	Transfer to Other Rail				-
	Total	-	-	-	2,070

4.5 Year 2010 Impacts on Vehicle Trips and Vehicle Miles of Travel

Table 4-8 presents the estimated incremental automobile trips (both auto mode and drive-to-commuter rail) and the estimated incremental Vehicle Miles of Travel.

Table 4-8 Year 2010 Incremental Daily Vehicles and Daily Vehicle Miles of Travel

	(NB13)	(T310)	(G310)
Incremental Vehicle Trips (vs. NB13)			
Incremental Auto Mode Trips	-	(2,819)	(11,165)
Incremental Drive-to-Transit Trips	-	5,232	21,180
Total	-	2,413	10,015
Incremental Vehicle Miles of Travel (vs. NB13)			
Incremental Auto Mode Trips	-	(119,378)	(374,313)
Incremental Drive-to-Transit Trips	-	9,665	32,527
Total	-	(109,713)	(341,786)

5. YEAR 2020 FORECASTING RESULTS

This chapter presents the results of the ridership forecasting models for the 2020 forecast year. Similar results for the 2010 forecast year are presented in Chapter 4. The results presented in this chapter include the impacts of the build and TSM projects on total transit and LIRR ridership (linked trip impacts) and on ridership to each LIRR Manhattan terminal. The difference between total LIRR ridership to GCT and the number of new LIRR linked trips is the number of existing riders diverted from Penn Station or some other terminal to the new service to GCT.

This chapter also presents ridership forecasting results that are used in the development of the draft environmental impact statement. This information includes the distribution of LIRR-to-GCT passengers to different Manhattan Zones for purposes of evaluating pedestrian congestion; vehicle-miles of travel impact, and estimates of parking demand for each station.

5.1 Year 2020 Linked Trip Impacts

One of the best indicators of the ability of a transit project to attract new customers and increase market share is the number of linked trips by mode. Linked trips by mode represent the region-wide total travel from each origin to each destination traveling on each mode. The linked trip tables are a direct outcome of the mode choice model and therefore the modes that can be reported are identical to the modes defined in the mode choice model. These modes are:

- Automobile
- Commuter Rail (including commuter rail/subway trips and commuter rail/bus trips)
- Subway (including subway/bus trips)
- Bus

In the case of the transit mode, each trip is counted once, no matter how many transfers are made or how many transit vehicles are boarded. Accordingly, this measure is directly related to the total travel by transit and provides a realistic basis for comparing alternatives the force many transfers to alternatives that force few transfers.

Table 5-1 presents a comparison of the Year 2020 Weekday (All-Day) Linked Trips by Mode for each of the 2020 scenarios discussed in Chapter 3. This table is stratified by trip purpose as follows:

- HBW – Home-Based Work
- HBO – Home-Based Other
- NHB – Non-Home-Based

Table 5-1 also presents the total (all purposes) incremental linked trips as compared to the No-Build Alternative (NB23). As this table shows, the total number of incremental linked trips for all modes of travel is very nearly equal to zero. This is a result of the fact that a fixed person trip table is used in this travel demand forecasting model and that total travel is constrained to the same number of person trips in any given year.

The number of incremental Year 2020 Weekday Automobile Trips shows that the TSM Alternative is able to reduce automobile travel by 4,100 trips per weekday and the LIRR-to-GCT Alternative is able to reduce Automobile Travel by 15,400 trips per weekday. Conversely, the model results also show that the TSM and LIRR-to-GCT Alternatives add 4,100 and 15,400 new weekday transit riders. This is the "New

Riders-as compared to No-Build" statistic included in the FTA Section 5309 *Annual Report on New Starts*. The number of New Riders as Compared to TSM is the difference between these two figures or 11,300 Daily New Riders.

Table 5-1 also presents an estimate of the number of commuter rail linked trips predicted by the mode choice model. This statistic is similar, but not identical, to the total number of LIRR and MNR trips in the region. It is not identical to the assigned commuter rail volumes since commuter rail trips may be assigned to non-commuter rail services and vice-versa in the capacity-constrained assignment. Nevertheless, the number new commuter rail trips (build versus no-build) predicted by the mode choice model provides an indication of the expected increases in daily LIRR daily trips. In 2020, the mode choice model predicts 32,000 additional daily LIRR linked trips in the LIRR-to-GCT build condition than in the No-Build. In addition, the assignment procedures assign an additional 3,600 non-commuter rail trips in the Build alternative due to the increased availability of LIRR capacity. The number of additional daily LIRR trips is presented in Table 5-2 and is equal to 35,600 additional daily LIRR trips in the Build Alternative as compared to the No-Build.

Table 5-1 Year 1995 and 2020 Weekday (All-Day) Linked Person Trips by Mode and Purpose

		1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
HBW					
	Auto	4,455,549	5,374,457	5,371,487	5,365,829
	Commuter Rail	285,682	392,124	394,942	412,021
	Subway	1,794,233	2,294,061	2,290,079	2,284,697
	Bus	455,831	469,441	473,575	467,535
	Total	6,991,295	8,530,082	8,530,083	8,530,083
HBO					
	Auto	6,450,701	7,187,266	7,186,329	7,181,572
	Commuter Rail	147,258	177,755	178,819	185,967
	Subway	1,065,638	1,239,252	1,238,245	1,237,988
	Bus	758,066	761,046	761,926	759,792
	Total	8,421,663	9,365,319	9,365,319	9,365,318
NHB					
	Auto	1,641,898	1,801,842	1,801,667	1,800,794
	Commuter Rail	57,712	63,142	63,439	66,995
	Subway	489,708	562,863	562,558	560,536
	Bus	128,210	123,100	123,282	122,621
	Total	2,317,528	2,550,947	2,550,946	2,550,946
TOTAL					
	Auto	12,548,148	14,363,565	14,359,483	14,348,195
	Commuter Rail	490,653	633,021	637,199	664,983
	Subway	3,349,579	4,096,176	4,090,882	4,083,221
	Bus	1,342,107	1,353,586	1,358,784	1,349,948
	Total	17,730,486	20,446,347	20,446,348	20,446,347
INCREMENTAL (versus NB23) TOTAL					
	Auto		-	(4,082)	(15,370)
	Commuter Rail		-	4,179	31,963
	Subway		-	(5,294)	(12,955)
	Bus		-	5,198	(3,638)
	Total		-	1	(0)

Note: Totals may not add due to rounding.

Table 5-2 2020 Incremental (versus No-Build) Daily LIRR Trips

	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
Commuter Rail Mode	-	4,179	31,963
Other Modes Assigned to Rail	-	(700)	3,630
Total	-	3,479	35,593

5.2 Year 2020 Station Utilization

Another important result of the ridership forecasting process is the number of trips utilizing key facilities that will be affected by the project. This statistic is equivalent to a number of riders that could be counted boarding or alighting at each station or the number of persons on-board trains as they travel to or from each terminal station.

Table 5-3 presents AM Peak 4-Hour (6-10 AM) and estimated daily LIRR riders arriving at each terminal. Table 5-4 and Table 5-5 present similar information for LIRR riders departing each terminal and the sum of arrivals plus departures, respectively.

The first two columns of each table represent passenger counts taken by the LIRR in 1990 and 1995 and are used to confirm the accuracy of the model results. The counts can be compared to the column labeled "NB95" which presents the modeled estimates of Year 1995 LIRR activity at each terminal. As this table shows, the model does an excellent job of representing total (all terminals) daily 1995 LIRR arrivals and departures. The model also does reasonably well in replicating the distribution of activity among individual terminals and travel occurring in the AM Peak 4-Hour Period as a fraction of daily activity.

The next three columns represent forecasted model activity at each terminal for the 2020 No-Build (NB23), the 2020 Transportation Systems Management (TSM3), and 2020 LIRR-to-GCT Build (GCT3) Alternatives. As shown in these tables, total daily passenger activity (arrivals plus departures) for all LIRR terminals is forecasted to increase from 245,900 daily arriving and departing passengers in 1995 to 307,800 in the 2020 No-Build, an increase of 25 percent. The TSM alternative reduces this to 303,700 daily arriving and departing passengers. This decline is largely due to substantial improvements to bus operations on the Long Island Expressway that attracts riders away from the LIRR and to express bus services.

The 2020 LIRR-to-GCT alternative (GCT3) increases total (all terminals) daily LIRR arrivals and departures to 351,000, an increase of 43,200 trips (14.0 percent) over the 2020 No-Build. Daily arrivals and departures at Grand Central Terminal will be 161,500 and the new Sunnyside Station will attract 5,500 daily riders. Activity at Penn Station will drop from 276,100 to 160,700, a drop of 115,300 (-42 percent).

The fact that LIRR terminal volumes increase by 43,200 while total LIRR volumes increases by only 35,600 is caused by a greater percentage of passengers utilizing Terminal Stations in the LIRR-to-GCT Build than in the No-Build. Key examples of this phenomenon are as follows:

- The addition of Sunnyside Station results in a drop of 2,700 daily passengers at Woodside. In effect demand is shifted from LIRR line stations to one of the terminal stations
- About 1,600 daily reverse peak trips are made between Penn Station and Sunnyside. Each such trip results in *two* arrivals or departures at the terminal stations.
- About 1,000 more trips make a rail-to-rail transfer at a terminal station in the Build Case than in the No-Build. Each such trip results in *two* arrivals or departures at the terminal stations.
- The service plan used to simulate the impact of LIRR service to GCT results in a modest drop in LIRR volumes to other non-terminal stations of approximately 1,200 intra-Long Island trips
- Approximately 1,800 trips are lost due to different peak period-to-daily factors being used at Hunterspoint and Flatbush Avenue represent the low (or non-existent) peak period utilization at these stations.

Table 5-3 Year 1995 and 2020 AM Peak and All-Day LIRR Arrivals by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
AM Peak (6-10 AM)						
Penn Station	86,950	86,630	86,851	110,522	106,849	62,249
Grand Central	0	0	0	0	0	65,676
Hunterspoint Ave	3,457	2,890	3,279	3,598	5,098	603
Long Island City	195	240	137	46	138	43
Flatbush Ave	12,942	11,670	10,610	12,144	13,049	10,519
Sunnyside	0	0	0	0	0	2,255
Total	103,544	101,430	100,878	126,310	125,135	141,345
All-Day						
Penn Station	106,270	107,570	109,212	138,727	134,341	80,777
Grand Central	0	0	0	0	0	81,140
Hunterspoint Ave	3,457	2,890	3,279	3,598	5,098	603
Long Island City	195	240	136	46	137	42
Flatbush Ave	13,466	14,650	12,721	14,285	15,313	12,493
Sunnyside	0	0	0	0	0	2,765
Total	123,388	125,350	125,349	156,656	154,889	177,819

Table 5-4 Year 1995 and 2020 AM Peak and All-Day LIRR Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
AM Peak (6-10 AM)						
Penn Station	2,930	3,000	4,082	4,987	5,008	5,008
Grand Central	0	0	0	0	0	1,884
Hunterspoint Ave	0	0	0	0	0	0
Long Island City	0	0	0	0	0	0
Flatbush Ave	475	1,290	648	499	502	537
Sunnyside	0	0	0	0	0	47
Total	3,405	4,290	4,731	5,486	5,510	7,476
All-Day						
Penn Station	107,410	106,680	108,120	137,340	132,997	79,969
Grand Central	0	0	0	0	0	80,329
Hunterspoint Ave	2,440	2,230	2,525	2,770	3,926	464
Long Island City	98	110	63	21	63	19
Flatbush Ave	9,959	11,300	9,795	10,999	11,791	9,619
Sunnyside	0	0	0	0	0	2,737
Total	119,907	120,320	120,503	151,131	148,777	173,138

Table 5-5 Year 1995 and 2020 AM Peak and All-Day LIRR Arrivals+Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
AM Peak (6-10 AM)						
Penn Station	89,880	89,630	90,934	115,509	111,857	67,258
Grand Central	0	0	0	0	0	67,560
Hunterspoint Ave	3,457	2,890	3,279	3,598	5,098	603
Long Island City	195	240	137	46	138	43
Flatbush Ave	13,417	12,960	11,258	12,642	13,552	11,056
Sunnyside	0	0	0	0	0	2,302
Total	106,949	105,720	105,609	131,795	130,645	148,821
All-Day						
Penn Station	213,680	214,250	217,332	276,067	267,338	160,746
Grand Central	0	0	0	0	0	161,469
Hunterspoint Ave	5,897	5,120	5,805	6,368	9,024	1,066
Long Island City	293	350	199	67	200	62
Flatbush Ave	23,425	25,950	22,517	25,285	27,104	22,112
Sunnyside	0	0	0	0	0	5,503
Total	243,295	245,670	245,852	307,786	303,666	350,957

5.3 Year 2020 Travel Time Savings

Travel time savings is one of the measures used in the Federal Transit Administration's (FTA) Section 5309 Annual Report on New Starts. This computation is performed on each zone-to-zone interchange using matrix computation procedures developed by KPMG for the FTA. The results of the travel time savings computation is presented in Table 5-6. In 2020, the build alternative will save 7.4 million hours annually as compared to the No-Build Alternative.

Table 5-6 Year 2020 Weekday and Annual Travel Time Savings

		2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
WEEKDAY PERSON-HOURS				
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	3,499	27,653
	In-Vehicle Time	0	2,283	(3,642)
	Total	0	5,782	24,011
TT Savings for New Riders				
	Out-of-Vehicle Time	0	213	2,594
	In-Vehicle Time	0	91	(334)
	Total	0	304	2,260
TT Savings for ALL				
	Out-of-Vehicle Time	0	3,712	30,247
	In-Vehicle Time	0	2,374	(3,976)
	Total	0	6,086	26,271
ANNUAL PERSON-HOURS				
Days/Year		282	282	282
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	986,718	7,798,146
	In-Vehicle Time	0	643,806	(1,027,044)
	Total	0	1,630,524	6,771,102
TT Savings for New Riders				
	Out-of-Vehicle Time	0	60,066	731,508
	In-Vehicle Time	0	25,662	(94,188)
	Total	0	85,728	637,320
TT Savings for ALL				
	Out-of-Vehicle Time	0	1,046,784	8,529,654
	In-Vehicle Time	0	669,468	(1,121,232)
	Total	0	1,716,252	7,408,422

5.4 Year 2020 Distribution of Terminal Station Passengers

Table 5-7 presents the distribution of arriving passengers at Penn Station, Grand Central Terminal and Sunnyside Station. This table shows the number of arriving passengers:

- Walking to each nearby zone
- Transferring to different subway lines
- Transferring to nearby bus services
- Transferring to other rail services at the same terminal.

Table 5-7 Year 2020 AM Peak Period Distribution of Arriving LIRR Passengers by Terminal

		1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
PENN STATION					
	Walk	50,793	63,021	60,784	33,856
	Transfer to Subway				
	- A/C/E SB	7,791	8,870	8,575	8,369
	- A/C/E NB	11,448	18,432	17,909	4,128
	- 1/2/3/9 SB	10,077	13,027	12,581	11,383
	- 1/2/3/9 NB	1,834	2,262	2,257	2,076
	- B/D/F/Q SB	1,681	1,684	1,645	1,399
	- B/D/F/Q NB	1,568	1,107	941	-
	- N/R SB	-	797	782	285
	- N/R NB	-	-	-	-
	Total Transfer to Subway	34,399	46,179	44,690	27,640
	Transfer to Bus	223	281	277	8
	Transfer to Other Rail	1,436	1,071	1,098	745
	Total	86,851	110,552	106,849	62,249
GRAND CENTRAL					
	Walk				54,433
	Transfer to Subway				
	- 4/5 SB				4,485
	- 6 SB				842
	- 4/5 NB				583
	- 6 NB				1,646
	- 7 EB				4
	- 7 WB				23
	- S				-
	Total Transfer to Subway	-	-	-	7,583
	Transfer to Bus				3,027
	Transfer to Other Rail				633
	Total	-	-	-	65,676
SUNNYSIDE					
	Walk				1,254
	Transfer to Subway				
	- 7				169
	- F/R				572
	- E				5
	- N				32
	Total Transfer to Subway	-	-	-	778
	Transfer to Bus				223
	Transfer to Other Rail				-
	Total	-	-	-	2,255

5.5 Year 2020 Impacts on Vehicle Trips and Vehicle Miles of Travel

Table 5-8 presents the estimated incremental automobile trips (both auto mode and drive-to-commuter rail) and the estimated incremental Vehicle Miles of Travel.

Table 5-8 Year 2020 Incremental Daily Vehicle Trips and Daily Vehicle Miles of Travel

	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
Incremental Vehicle Trips (vs. NB23)			
Incremental Auto Mode Trips	-	(3,401)	(12,087)
Incremental Drive-to-Transit Trips	-	4,039	23,413
Total	-	638	11,325
Incremental Vehicle Miles of Travel (vs. NB23)			
Incremental Auto Mode Trips	-	(128,772)	(410,583)
Incremental Drive-to-Transit Trips	-	9,182	35,921
Total	-	(119,590)	(374,662)

6. ASSESSMENT OF FORECAST RISKS

The ridership forecasts presented in this report are based on travel demand forecasting models that represent existing travel patterns and behavior and attempt to predict behavior in a future year based on assumptions regarding population and employment, the transportation system, fare policy, and other transportation-related policies. Like any forecast of the future, the reliability of these forecasts is related to the accuracy and appropriateness of the analytical techniques and the underlying assumptions.

The forecasting techniques and assumptions used in these forecasts are the result of a collaborative effort of the Long Island Rail Road, the Metropolitan Transportation Authority and its operating agencies, and KPMG LLP. This effort has stressed the need to maintain a consistent set of methodologies and assumptions among all of the on-going transit planning projects in the region. The forecasts of population, employment, and total travel which serve as input assumptions for the LIRR ESA DEIS forecasts may or may not be realized and consequently, the forecasts of ridership for the new service may or may not occur. The consistency of the assumptions between different alternatives and between different projects means that the resulting forecasts should be useful in the process of ranking each alternative and each project.

Some of the most important assumptions and their impact on forecasted ridership are described below. Additionally, independent observations used to confirm the reasonableness of the various forecast results are also presented.

1. **Sensitivity to Socioeconomic Factors.** The county-level population and employment forecasts are based on the adopted NYMTC forecasts for 2010 and 2020. NYMTC used these forecasts to develop projections of county-to-county journey-to-work travel for 1990, 1995, 2010, and 2020. The resulting journey-to-work forecasts were used as the basis for the projected growth in commuter travel in this report. The NYMTC journey-to-work forecasts show the following percentage increases in travel to Manhattan:

Table 6-1 Summary of Forecasted Journey-to-Work Growth by County

Origin	1995	2010		2020	
County	JTW	JTW	%Change	JTW	%Change
Queens	318,051	366,818	15.3%	380,610	19.7%
Nassau	96,676	112,706	16.6%	117,188	21.2%
Suffolk	35,112	46,625	32.8%	51,011	45.3%

The forecasted rate of growth has a direct impact on future year LIRR ridership. For example, if the actual growth in Suffolk-to-Manhattan journey-to-work is only 23 percent between 1995 and 2020, then LIRR ridership from Suffolk to Manhattan will only grow by half of the forecasted amount during that same time period.

2. **Sensitivity to Fare Policy.** The fares assumed for 2010 and 2020 are based on current MTA policies that indicate that commuter rail fares will remain unchanged between November 1995 and the Year 2000. No adopted MTA fare policy exists beyond the Year 2000. All MTA Long Range Planning Framework projects have assumed that after the Year 2000, fares will rise in proportion to the Consumer Price Index. This assumption results in a drop in real fares (as measured in constant year dollars) between Spring-Early Fall 1995 and the Year 2020 (or 2010) of between 3 and 4 percent (depending on location).

The sensitivity to fare that is built into the model is based on stated preference survey research conducted by MVA Consultancy for the Lower Manhattan Project and indicates that every 10 cents of fare is worth 0.75 minutes of travel time. Another way of expressing this relationship is that each hour of time is worth $8.00. These results are consistent with those used in similar models used elsewhere in the United States. The effect of the assumed drop in fare between 1995 and the forecast years is approximately the same as assuming that each travel is able to save one minute over the equivalent trip in 1995. If the fare policy in 2010 or 2020 changes then the forecasted ridership would be expected to change as well.

3. **Sensitivity to Service Plan.** Forecasts of ridership to Grand Central Terminal included in this report are based on preliminary service plans developed by Systra Consulting, Inc. in April 1999. These service plans are continuing to evolve and will be updated shortly. The distribution of travelers to Penn Station and to Grand Central is highly sensitive to the relative level-of-service offered from each origin station to each Manhattan terminal. Preliminary runs of the current demand forecasting model that differed only in the mix of express and local trains on each branch to Penn Station and Grand Central Terminal indicated a substantial range in the forecasted ridership to Grand Central Terminal. In particular, forecasted AM Peak 4-Hour LIRR arrivals at Grand Central Terminal varied from 60,000 to 68,000 based solely on the assumed stopping patterns for each train serving Grand Central Terminal. At present, a final schedule showing stopping patterns for each train has not been developed and therefore, the forecasts of LIRR ridership to Grand Central Terminal may change over time.

4. **Sensitivity of Model to Work Locations Within Manhattan.** The methodology used to prepare forecasts of customer choice between Penn Station and Grand Central Terminal is based on a network model calibrated to replicate the choices made between Hunterspoint Avenue, Long Island City, Flatbush Avenue, and Penn Station. The ability of the model to properly predict the ridership impacts to Grand Central Terminal is dependent on:

   - Consistency between traveler response in 1995 to the LIRR terminal choices then available and the future year choice between Penn Station and Grand Central Terminal.
   - The distribution of existing and future travel destinations within Manhattan (e.g., East Midtown versus West Midtown versus Lower Manhattan)

   The model forecasts that in 2020, LIRR travel to Manhattan will be divided as follows:

   - Penn Station: 44 percent
   - Grand Central Terminal: 46 percent
   - Other terminals: 10 percent

   By contrast, in 1990, Penn Station attracted 86.5 percent of the LIRR trips to Manhattan and in 2020 with dual mode trains (but without Grand Central Terminal), Penn Station is expected to attract 87.5 percent of LIRR travel to Manhattan.

   As shown in Table 6-2, below, the model has assigned travel to Grand Central Terminal in rough proportion to the distribution of travel in 1990 to the East Midtown and Upper East Side areas of Manhattan—the principal markets for this service. The model is assumes relatively little travel to Lower Manhattan will travel through Grand Central Terminal. This suggests that the modeled distribution of travelers between Penn Station and GCT is consistent with the underlying Census distribution of travel.

Table 6-2 Distribution of 1990 LIRR Attractions by Location Within Manhattan

Location	Attractions	Percent
East Midtown/Upper East Side	88,913	44%
West Midtown/Upper West Side	58,585	29%
Lower Manhattan	54,777	27%
	202,275	100%

Source: 1990 Person Trip Tables Derived from 1990 Census Transportation Planning Package

5. **Reasonableness of the Modeling Approach.** The forecasted ridership is a direct outcome of the analytical techniques that comprise the model. Like any analytical technique, the model is a simplification of very complex behavior and consequently, the results should be (and have been) checked for reasonableness. Perhaps the best independent check of the model reasonableness is to check the results of the LIRR to GCT forecasts against stated preference survey research conducted in earlier studies. In a 1986 survey conducted for the LIRR, the Caliper Corporation[1] estimated that approximately 42 percent of the then current riders would prefer to travel to GCT over Penn Station and that another 15 percent indicated that they might shift from Penn Station to Grand Central. About 37 percent of all existing non-LIRR riders to Manhattan would consider switching to the LIRR if an East Side Terminal were available.

   The model forecasts are reasonably consistent with this survey finding. The model shows a Grand Central-Penn Station split of 51-49. If all of the surveyed travelers who prefer Grand Central and half of those who said they might shift to Grand Central were to actually shift, then according to the survey, this split should be 50-50.

   The model shows that the introduction of LIRR service to Grand Central will increase LIRR ridership to Manhattan terminal by 11 percent. By comparison, given the LIRR share of travel from Nassau and Suffolk Counties (67 percent in 1990) and the assumption that half of the survey non-riders who would consider shifting would actually shift to the LIRR, the survey implies that LIRR ridership should grow by approximately 9 percent.

   These results suggest that the model approximately replicates an independent survey of LIRR customer stated preference.

[1] Caliper Corporation, *East Side Access Study Final Report,* June 10, 1986.

APPENDIX

DETAILED TABLES OF RESULTS

Table A-1
AM PEAK WEEKDAY 4-HOUR ARRIVALS AND DEPARTURES BY STATION

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
COMMUTER RAIL										
LIRR										
Arrivals	Penn Station	86,950	86,630	86,851	103,856	100,348	58,154	110,522	106,849	62,249
	Grand Central			0	0	0	62,334	0	0	65,676
	Hunterspoint	3,457	2,890	3,279	3,260	4,682	514	3,598	5,098	603
	Long Island City	195	240	137	44	131	40	46	138	43
	Flatbush (adj for 2-way)	12,942	10,336	10,610	11,374	12,275	9,911	12,144	13,049	10,519
	Sunnyside			0	0	0	2,070	0	0	2,255
	Total	103,544	100,096	100,878	118,533	117,435	133,024	126,310	125,135	141,345
Departure	Penn Station	2,930	3,000	4,082	4,522	4,837	5,115	4,987	5,008	5,008
	Grand Central			0	0	0	1,108	0	0	1,884
	Hunterspoint			0	0	0	0	0	0	0
	Long Island City			0	0	0	0	0	0	0
	Flatbush Avenue	475	1,290	648	480	469	483	499	502	537
	Sunnyside			0	0	0	68	0	0	47
	Total	3,405	4,290	4,731	5,001	5,306	6,774	5,486	5,510	7,476
MNR										
Arrivals	Grand Central	66,763	70,169	70,346	84,164	84,150	84,153	88,738	88,737	88,811
	125th Street			2,703	2,924	2,926	2,924	3,171	3,052	3,167
	Total			73,049	87,088	87,075	87,078	91,909	91,789	91,978
Departure	Grand Central	2,675	4,064	2,461	3,024	3,026	3,111	3,099	3,105	3,198
	125th Street			926	969	970	973	1,050	980	1,043
	Total			3,387	3,993	3,996	4,084	4,149	4,085	4,241
STATEN ISLAND FERRY										
Arrivals	Whitehall Terminal		18,993	18,617	35,162	35,308	35,253	35,142	35,227	35,158
Departure	Whitehall Terminal		1,389	1,926	2,826	2,830	2,830	3,076	3,079	3,077

Table A-2
AM PEAK WEEKDAY 4-HOUR 60TH STREET SUBWAY SCREENLINE CROSSINGS

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
SUBWAY										
60TH STREET										
In	IRT Lexington Express	77,312	79,819	83,873	90,704	90,992	90,712	95,114	95,360	94,836
	IRT Lexington Local	48,830	45,819	50,108	50,425	50,569	50,617	52,293	52,425	52,746
	IND 8th Ave Express	52,068	62,315	45,494	49,828	49,839	49,923	52,535	52,565	52,502
	IND 8th Ave Local	15,591	18,683	26,290	29,513	29,495	29,336	30,628	30,446	30,344
	IRT Broadway Express	61,171	54,762	49,273	58,823	58,449	59,019	61,431	61,053	61,300
	IRT Broadway Local	38,248	42,015	53,490	61,518	61,591	61,282	63,059	63,207	63,409
	Total	293,220	303,413	308,528	340,811	340,935	340,889	355,060	355,056	355,136
Out	IRT Lexington Express	17,698	26,000	26,210	31,826	31,850	32,279	32,923	33,116	33,811
	IRT Lexington Local	30,685	29,834	36,961	37,143	37,396	37,622	38,496	38,560	38,610
	IND 8th Ave Express	13,436	10,549	27,209	35,500	35,472	34,917	36,963	36,982	36,340
	IND 8th Ave Local	3,737	5,457	8,372	10,469	10,417	10,140	10,720	10,633	10,365
	IRT Broadway Express	17,201	16,803	19,846	12,404	12,409	12,267	12,815	12,800	12,672
	IRT Broadway Local	16,378	15,770	7,753	20,159	20,163	20,147	20,843	20,906	20,862
	Total	99,135	104,413	126,350	147,501	147,708	147,373	152,759	152,996	152,660

Table A-3
AM PEAK WEEKDAY 4-HOUR BROOKLYN SUBWAY SCREENLINE CROSSINGS

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
SUBWAY										
BROOKLYN										
In	BMT 14th St Tunnel	26,999	28,516	28,266	35,048	35,049	35,030	36,543	36,643	36,677
	BMT Williamsburg Br	28,584	26,832	34,085	41,645	41,289	41,728	43,637	43,324	43,583
	IND Rutgers Tunnel	23,085	29,536	27,371	36,860	36,624	36,767	38,288	38,146	38,303
	BMT Manhattan Br	76,882	64,339	62,672	81,553	83,010	82,635	86,710	86,892	87,518
	IND Cranberry Tun	58,681	69,096	63,825	62,716	62,843	62,530	65,761	65,791	65,548
	IND Clark Tunnel	43,354	31,950	28,496	32,004	32,052	31,791	33,715	33,526	33,274
	BMT Montague Tunnel	27,629	35,217	21,015	37,718	36,379	36,495	37,472	37,601	36,915
	IRT Joralemon Tunnel	69,030	56,496	54,090	56,587	57,249	55,606	58,588	59,237	57,272
	Total	354,244	341,982	319,819	384,131	384,495	382,583	400,714	401,161	399,091
Out	BMT 14th St Tunnel	6,923	5,979	8,619	10,283	10,122	10,264	10,722	10,556	10,708
	BMT Williamsburg Br	3,379	3,097	6,387	6,376	6,368	6,378	6,627	6,641	6,644
	IND Rutgers Tunnel	6,931	7,900	10,970	8,758	8,814	8,855	9,777	9,726	9,623
	BMT Manhattan Br	9,510	8,297	6,906	9,704	9,692	9,728	10,220	10,212	10,239
	IND Cranberry Tun	9,538	10,297	8,915	8,082	8,102	8,088	8,637	8,630	8,596
	IND Clark Tunnel	6,709	6,692	4,790	4,938	4,908	4,900	5,166	5,144	5,165
	BMT Montague Tunnel	4,092	5,959	3,930	8,462	8,409	8,445	8,881	8,869	8,895
	IRT Joralemon Tunnel	8,678	11,155	8,725	8,943	8,865	8,840	9,214	9,260	9,419
	Total	55,760	59,376	59,242	65,546	65,280	65,498	69,243	69,038	69,289

Table A-4
AM PEAK WEEKDAY 4-HOUR QUEENS SUBWAY & BUS SCREENLINE CROSSINGS

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
SUBWAY										
QUEENS										
In	BMT 60th St	61,905	63,035	66,317	67,260	67,204	67,273	70,652	70,848	70,368
	IND 53rd St	113,246	116,516	116,575	98,071	97,688	96,243	102,343	102,222	100,750
	IRT Steinway	63,217	54,171	56,804	96,944	99,902	91,886	100,861	103,736	95,753
	63rd St Tunnel	3,143	3,560	3,277	37,503	37,570	36,445	39,661	39,422	38,354
	Total	241,511	237,282	242,973	299,778	302,364	291,847	313,517	316,228	305,226
Out	BMT 60th St	10,369	9,227	10,122	6,851	6,907	6,947	7,429	7,511	7,503
	IND 53rd St	18,950	16,284	16,727	23,519	23,362	23,123	25,047	25,015	24,782
	IRT Steinway	13,270	12,858	13,626	15,728	15,726	15,599	16,919	16,901	16,658
	63rd St Tunnel	1,994	2,457	9,553	14,805	14,578	13,722	15,465	15,182	14,361
	Total	44,583	40,826	50,028	60,904	60,573	59,391	64,859	64,609	63,304
BUS										
In	Brooklyn Battery Tun.	17,069	14,025	17,009	13,983	13,883	13,902	13,905	13,823	13,855
	Manhattan Bridge	463	325	14	6	6	6	5	5	5
	Queensboro Bridge	2,300	2,232	658	579	580	679	607	625	707
	Queens Midtown Tun.	12,094	9,364	5,243	1,400	2,261	1,140	1,466	2,344	1,176
	Williamsburg Bridge	180	293	6	0	0	0	0	0	0
	60th Street	30,726	24,280	27,630	18,804	18,745	18,856	19,227	19,137	19,289
	Total	62,832	50,519	50,560	34,772	35,475	34,583	35,210	35,934	35,032
Out	Brooklyn Battery Tun.	72		0	0	0	0	0	0	0
	Manhattan Bridge	128		1	0	0	0	0	0	0
	Queensboro Bridge	690		468	263	248	281	272	271	275
	Queens Midtown Tun.	349		0	0	0	0	0	0	0
	Williamsburg Bridge	247		0	1	1	1	1	1	1
	60th Street	8,597		7,298	7,701	7,704	8,213	7,871	7,902	8,423
	Total	10,083		7,767	7,965	7,953	8,495	8,144	8,174	8,699

Table A-5
WEEKDAY (ALL-DAY) LINKED PERSON TRIPS BY MODE

	BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
PERSON TRIPS BY MODE (INTRAZONAL TRIPS EXCLUDED)							
HBW							
Auto	4,455,549	4,898,639	4,896,172	4,890,530	5,374,457	5,371,487	5,365,829
Commuter Rail	285,682	368,126	371,172	386,916	392,124	394,942	412,021
Subway	1,794,233	2,185,990	2,181,888	2,176,926	2,294,061	2,290,079	2,284,697
Bus	455,831	443,267	446,791	441,652	469,441	473,575	467,535
Total	6,991,295	7,896,022	7,896,023	7,896,024	8,530,082	8,530,083	8,530,083
HBO							
Auto	6,450,701	6,763,135	6,762,488	6,757,846	7,187,266	7,186,329	7,181,572
Commuter Rail	147,258	167,406	169,184	174,621	177,755	178,819	185,967
Subway	1,065,638	1,198,240	1,197,107	1,197,121	1,239,252	1,238,245	1,237,988
Bus	758,066	734,394	734,396	733,587	761,046	761,926	759,792
Total	8,421,663	8,863,175	8,863,176	8,863,175	9,365,319	9,365,319	9,365,318
NHB							
Auto	1,641,898	1,704,763	1,704,469	1,703,962	1,801,842	1,801,667	1,800,794
Commuter Rail	57,712	59,383	60,296	62,547	63,142	63,439	66,995
Subway	489,708	546,901	546,344	544,837	562,863	562,558	560,536
Bus	128,210	118,854	118,791	118,555	123,100	123,282	122,621
Total	2,317,528	2,429,901	2,429,901	2,429,901	2,550,947	2,550,946	2,550,946
TOTAL							
Auto	12,548,148	13,366,537	13,363,129	13,352,338	14,363,565	14,359,483	14,348,195
Commuter Rail	490,653	594,915	600,652	624,084	633,021	637,199	664,983
Subway	3,349,579	3,931,131	3,925,339	3,918,884	4,096,176	4,090,882	4,083,221
Bus	1,342,107	1,296,515	1,299,979	1,293,794	1,353,586	1,358,784	1,349,948
Total	17,730,486	19,189,098	19,189,099	19,189,100	20,446,347	20,446,348	20,446,347
INCREMENTAL (INTRAZONAL TRIPS EXCLUDED) TOTAL							
Auto	0	0	(3,408)	(14,199)	0	(4,082)	(15,370)
Commuter Rail	0	0	5,738	29,169	0	4,179	31,963
Subway	0	0	(5,793)	(12,247)	0	(5,294)	(12,955)
Bus	0	0	3,464	(2,722)	0	5,198	(3,638)
Total	0	0	1	1	0	1	(0)

Table A-6
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT PENN STATION

	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
WALK TO FINAL DESTINATION							
85	74.78	71.57	68.85	71.35	73.47	70.53	72.84
92	0.14	0.13	0.13	135.48	0.14	0.14	143.10
93	171.18	174.88	167.96	175.65	187.97	180.17	187.79
94	1,216.41	1,230.10	1,182.06	1,235.71	1,319.95	1,265.84	1,318.84
97	2,411.80	2,399.18	2,305.87	2,431.82	2,520.20	2,417.28	2,540.72
98	413.70	679.41	654.24	704.70	717.54	689.57	739.91
111	191.14	198.80	199.30	0.00	208.47	208.60	0.00
114	0.04	41.97	40.33	0.00	44.76	42.91	0.00
115	234.98	238.57	231.53	0.00	251.63	243.69	0.00
116	587.74	586.63	579.90	0.00	616.79	608.69	0.00
117	1,740.67	1,760.84	1,748.56	0.00	1,851.03	1,834.90	0.00
118	1,060.27	1,027.36	986.61	439.80	1,078.98	1,034.12	458.92
119	1,763.46	1,787.27	1,722.80	0.00	1,872.29	1,801.09	0.00
120	3,023.73	3,008.99	2,895.67	0.00	3,142.89	3,018.38	0.00
121	2,414.67	2,315.42	2,224.94	2,344.37	2,420.20	2,320.95	2,437.07
122	0.48	1,301.92	1,250.89	1,315.67	1,371.51	1,315.10	1,378.35
123	1,689.91	1,646.22	1,588.56	1,762.76	1,715.85	1,652.32	1,825.80
124	3,112.09	3,582.91	3,448.26	3,636.98	3,996.91	3,838.75	4,034.47
125	887.37	996.37	964.09	998.28	1,110.06	1,071.92	1,106.11
126	1,904.33	1,841.57	1,768.56	1,856.24	1,905.26	1,826.02	1,909.95
127	1,625.11	1,564.63	1,504.44	1,562.13	1,616.44	1,551.09	1,605.30
128	504.49	539.68	518.86	545.12	575.80	552.48	578.55
129	2,344.84	2,499.58	2,404.03	2,528.86	2,659.21	2,552.29	2,675.88
130	259.71	265.08	254.55	265.41	279.88	268.20	278.74
131	176.62	198.06	190.29	199.85	210.36	201.70	211.14
132	67.50	103.81	99.95	100.89	139.56	134.07	134.76
133	459.65	703.92	676.64	707.79	947.70	909.07	947.30
134	0.74	830.66	799.17	837.43	945.45	907.73	947.88
135	650.35	626.09	602.43	626.23	708.40	680.24	704.66
136	349.47	527.92	507.37	539.71	715.29	686.02	727.12
137	1.50	52.25	50.53	53.25	59.61	57.54	60.42
138	0.07	529.76	511.49	536.04	556.36	536.07	559.88
139	496.28	475.07	457.82	495.07	546.27	525.38	566.19
140	234.67	211.00	202.97	223.75	241.88	232.17	254.96
141	0.00	264.37	254.94	273.72	304.18	292.71	313.19
142	0.39	337.86	325.11	343.31	352.79	338.80	356.51
143	454.52	446.38	429.91	452.61	469.32	451.08	473.34
144	1,060.55	1,195.09	1,151.47	1,245.85	1,305.21	1,254.94	1,352.60
145	1,117.34	1,230.06	1,185.71	1,261.29	1,330.04	1,279.41	1,356.00
146	1,678.74	1,858.55	1,791.22	252.54	2,017.43	1,940.35	272.35
147	307.87	340.63	327.70	55.29	369.10	354.37	59.55
148	1,320.52	1,334.46	1,286.04	0.00	1,435.21	1,380.27	0.00
149	1,122.11	1,101.89	1,060.98	551.09	1,184.14	1,137.86	588.68
150	603.84	614.16	591.97	118.68	664.20	638.90	126.75

(CONTINUED)

Table A-6
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT PENN STATION (CONTINUED)

	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
WALK TO FINAL DESTINATION							
151	0.00	950.98	916.74	512.28	1,021.64	982.84	550.36
152	725.91	710.54	682.88	0.00	757.24	726.26	0.00
153	0.52	0.00	0.00	0.00	0.00	0.00	0.00
154	3,733.60	4,019.08	3,889.25	0.00	4,347.92	4,198.51	0.00
155	3,562.18	3,464.24	3,354.75	0.00	3,608.98	3,487.65	0.00
156	2,224.37	2,232.98	2,208.07	0.00	2,335.28	2,305.17	0.00
157	0.00	1,121.23	1,098.94	0.00	1,164.56	1,139.36	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	1,160.16	1,151.68	1,108.86	0.00	1,201.73	1,154.74	0.00
162	224.80	220.89	214.81	0.00	230.89	224.04	0.00
163	0.00	197.69	192.15	0.00	205.04	198.88	0.00
164	0.00	559.50	537.63	0.00	581.82	558.00	0.00
165	144.47	147.74	144.28	0.00	155.98	152.02	0.00
166	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	0.00	52.84	50.80	0.00	54.74	52.51	0.00
168	686.47	641.96	640.67	0.00	664.79	662.41	0.00
169	553.91	537.06	529.54	0.00	557.80	549.03	0.00
170	40.86	87.52	83.93	0.00	92.88	88.90	0.00
TOTAL	50,793.00	58,837.00	56,868.00	31,397.00	63,021.00	60,784.00	33,856.00
TRANSFERS TO SUBWAY							
Subway Routes A/C/E SB	7,791	8,487	8,149	8,015	8,870	8,575	8,369
Subway Routes A/C/E NB	11,448	17,407	16,864	3,765	18,432	17,909	4,128
Subway Routes 1/2/3/9 SB	10,077	12,354	11,838	10,713	13,027	12,581	11,383
Subway Routes 1/2/3/9 NB	1,834	2,140	2,129	1,944	2,262	2,257	2,076
Subway Routes B/D/F/Q SB	1,681	1,586	1,536	1,313	1,684	1,645	1,399
Subway Routes B/D/F/Q NB	1,568	1,069	932	-	1,107	941	-
Subway Routes N/R SB	-	763	748	273	797	782	285
Subway Routes N/R NB	-	-	-	-	-	-	-
TOTAL TO SUBWAY	34,399	43,806	42,196	26,023	46,179	44,690	27,640
TOTAL BUS TRANSFERS	223	265	263	8	281	277	8
TOTAL LIRR@NYPS	85,415	102,908	99,327	57,428	109,481	105,751	61,504

Table A-7
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT GRAND CENTRAL TERMINAL

	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
WALK TO FINAL DESTINATION						
111	0	0	308.77	0	0	321.52
114	0	0	54.42	0	0	57.62
115	0	0	288.12	0	0	302.72
116	0	0	885.31	0	0	924.72
117	0	0	2,593.77	0	0	2,711.88
118	0	0	674.69	0	0	706.82
119	0	0	2,407.41	0	0	2,509.53
120	0	0	3,506.74	0	0	3,651.21
123	0	0	1,802.83	0	0	1,874.74
146	0	0	2,152.37	0	0	2,330.46
147	0	0	320.46	0	0	346.48
148	0	0	1,610.34	0	0	1,727.02
149	0	0	788.94	0	0	845.99
150	0	0	717.71	0	0	774.12
151	0	0	484.58	0	0	519.79
152	0	0	898.87	0	0	956.00
153	0	0	3,337.54	0	0	3,592.10
154	0	0	5,480.30	0	0	5,905.50
155	0	0	4,971.62	0	0	5,150.13
156	0	0	3,561.01	0	0	3,693.86
157	0	0	1,805.31	0	0	1,865.02
158	0	0	3,715.59	0	0	3,867.53
159	0	0	1,623.85	0	0	1,689.91
160	0	0	1,644.42	0	0	1,711.51
161	0	0	1,550.82	0	0	1,611.45
162	0	0	321.07	0	0	333.84
163	0	0	256.22	0	0	265.00
164	0	0	725.36	0	0	751.23
165	0	0	184.45	0	0	193.83
166	0	0	854.91	0	0	884.40
167	0	0	74.06	0	0	76.34
168	0	0	1,179.24	0	0	1,213.07
169	0	0	919.35	0	0	948.73
170	0	0	112.55	0	0	118.92
TOTAL PEDESTRIANS			51,813.00			54,433.00
TRANSFERS TO SUBWAY						
Subway Route 4/5 SB	0	0	4,223	0	0	4,485
Subway Route 6 SB	0	0	810	0	0	842
Subway Route 4/5 NB	0	0	683	0	0	583
Subway Route 6 NB	0	0	1,634	0	0	1,646
Subway Route 7 EB	0	0	4	0	0	4
Subway Route 7 WB	0	0	21	0	0	23
Subway Route S	0	0	-	0	0	-
TOTAL TO SUBWAY	0	0	7,375	0	0	7,583
TRANSFERS TO BUS	0	0	2,556	0	0	3,027
TOTAL LIRR@GCT	0	0	61,745	0	0	65,043

Table A-8
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT SUNNYSIDE YARD STATION

STATION LOCATION	BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
LONG ISLAND RAILROAD							
TO SUBWAY							
Subway Route 7	0	0	0	169	0	0	169
Subway Routes F/R	0	0	0	540	0	0	572
Subway Route E	0	0	0	5	0	0	5
Subway Route N	0	0	0	29	0	0	32
Subtotal	0	0	0	743	0	0	779
WALK TO FINAL DESTINATION ZONE							
Zone 687	0	0	0	212	0	0	234
Zone 692	0	0	0	171	0	0	180
Zone 695	0	0	0	0	0	0	0
Zone 696	0	0	0	293	0	0	380
Zone 697	0	0	0	440	0	0	459
Subtotal	0	0	0	1,115	0	0	1,254
TO BUS							
Total Bus Transfers	0	0	0	212	0	0	223
Total LIRR @ Sunnyside Yard	0	0	0	2,070	0	0	2,255

Table A-9
INCREMENTAL TRAVEL TIMES SAVINGS VERSUS NO-BUILD

STATION LOCATION	BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
DAILY PERSON HOURS							
TT Savings for Existing Riders							
Out-of-Vehicle Time	0	0	3,270	25,997	0	3,499	27,653
In-Vehicle Time	0	0	2,984	(3,812)	0	2,283	(3,642)
Total	0	0	6,254	22,185	0	5,782	24,011
TT Savings for New Riders							
Out-of-Vehicle Time	0	0	205	2,369	0	213	2,594
In-Vehicle Time	0	0	(39)	(249)	0	91	(334)
Total							
TT Savings for ALL							
Out-of-Vehicle Time	0	0	3,475	28,366	0	3,712	30,247
In-Vehicle Time	0	0	2,945	(4,061)	0	2,374	(3,976)
Total	0	0	6,420	24,305	0	6,086	26,271
ANNUAL PERSON HOURS							
Days/Year	282	282	282	282	282	282	282
TT Savings for Existing Riders							
Out-of-Vehicle Time	0	0	922,140	7,331,154	0	986,718	7,798,146
In-Vehicle Time	0	0	841,488	(1,074,984)	0	643,806	(1,027,044)
Total	0	0	1,763,628	6,256,170	0	1,630,524	6,771,102
TT Savings for New Riders							
Out-of-Vehicle Time	0	0	57,810	668,058	0	60,066	731,508
In-Vehicle Time	0	0	(10,998)	(70,218)	0	25,662	(94,188)
Total	0	0	46,812	597,840	0	85,728	637,320
TT Savings for ALL							
Out-of-Vehicle Time	0	0	979,950	7,999,212	0	1,046,784	8,529,654
In-Vehicle Time	0	0	830,490	(1,145,202)	0	669,468	(1,121,232)
Total	0	0	1,810,440	6,854,010	0	1,716,252	7,408,422

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
CITY TERMINAL ZONE																			
3000	New York-Penn Station	84,811	3,269	88,080	86,630	3,269	89,899	85,415	3,772	89,187	102,908	4,109	107,017	99,327	4,385	103,712	57,428	4,693	62,121
3807	New York-GCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61,744	1,096	62,840
3002	Hunterspoint Ave	3,457	0	3,457	2,890	0	2,890	3,263	0	3,263	3,287	31	3,318	6,989	28	7,017	541	28	570
3001	Long Island City	195	0	195	240	0	240	140	3	143	44	0	44	131	0	131	40	0	40
3091	Flatbush Ave	11,935	475	12,410	10,291	475	10,766	10,499	598	11,097	11,292	463	11,755	12,194	455	12,650	9,833	468	10,301
	Subtotal	100,398	3,744	104,142	100,051	3,744	103,795	99,318	4,373	103,691	117,530	4,604	122,134	118,642	4,868	123,509	129,587	6,285	135,872
3806	Jamaica Penn Station	3,582	2,308	5,890	3,538	2,292	5,830	3,131	964	4,095	3,909	1,078	4,987	3,888	1,082	4,970	4,203	1,448	5,652
3003	Woodside	659	495	1,154	802	521	1,323	1,077	250	1,327	1,913	210	2,124	1,646	202	1,848	859	190	1,049
3808	Sunnyside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,010	67	2,077
3004	Forest Hills	62	352	414	58	433	491	272	41	313	382	48	429	414	54	468	357	65	421
3005	Kew Gardens	30	447	477	39	467	506	206	89	295	320	32	353	323	38	360	338	38	376
3092	Nostrand Ave	156	14	170	105	14	119	175	49	224	193	34	228	195	35	231	188	34	221
3093	East New York			0	117	1	118	274	64	337	304	68	372	311	70	381	300	97	397
	Subtotal	4,489	3,616	8,105	4,659	3,728	8,387	5,134	1,457	6,591	7,022	1,471	8,492	6,777	1,480	8,257	8,254	1,938	10,192
	Total	104,887	7,360	112,247	104,710	7,472	112,182	104,452	5,830	110,282	124,552	6,074	130,626	125,419	6,348	131,767	137,841	8,223	146,064
BABYLON BRANCH																			
3049	Babylon	230	3,325	3,555	195	3,265	3,460	101	2,800	2,901	137	3,603	3,740	146	3,965	4,111	128	3,031	3,159
3048	Lindenhurst	97	1,526	1,623	91	1,278	1,369	56	1,230	1,286	64	1,940	2,004	66	1,721	1,787	67	2,823	2,890
3047	Copiague	150	1,015	1,165	145	1,001	1,146	48	1,186	1,235	62	1,681	1,742	64	1,684	1,748	66	1,820	1,887
3046	Amityville	162	831	993	210	727	937	180	1,005	1,185	211	1,418	1,629	214	1,422	1,636	216	1,547	1,763
3045	Massapequa Park	52	1,666	1,718	50	1,481	1,531	32	1,817	1,849	40	2,162	2,202	41	2,167	2,207	41	2,461	2,502
3044	Massapequa	91	2,708	2,799	90	2,522	2,612	60	2,181	2,240	73	2,594	2,667	75	2,602	2,677	84	2,519	2,603
3043	Seaford	63	1,566	1,629	58	1,435	1,493	53	1,773	1,825	63	2,048	2,111	64	2,053	2,116	65	1,996	2,060
3042	Wantagh	64	2,788	2,852	53	2,739	2,792	49	2,233	2,282	58	2,583	2,641	59	2,571	2,630	58	2,472	2,530
3041	Bellmore	75	2,800	2,875	92	2,698	2,790	65	2,295	2,360	76	2,744	2,820	73	2,749	2,821	79	2,887	2,965
3040	Merrick	55	2,827	2,882	70	2,812	2,882	126	2,535	2,661	141	2,998	3,139	143	3,000	3,143	143	3,233	3,376
3039	Freeport	195	1,642	1,837	200	1,672	1,872	121	2,087	2,208	137	2,447	2,583	134	2,454	2,587	146	2,573	2,719
3038	Baldwin	97	3,014	3,111	114	2,914	3,028	73	3,125	3,198	86	3,653	3,739	86	3,660	3,747	93	4,293	4,386
3037	Rockville Centre	207	2,414	2,621	215	2,191	2,406	275	1,895	2,170	298	1,984	2,282	303	1,984	2,287	307	2,089	2,397
	Total	1,538	28,122	29,660	1,583	26,735	28,318	1,238	26,162	27,400	1,445	31,854	33,299	1,466	32,030	33,496	1,492	33,745	35,237

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
FAR ROCKAWAY BRANCH																			
3127	Far Rockaway	16	113	129	22	58	80	5	70	75	16	418	434	16	420	436	16	423	439
3126	Inwood	9	225	234	9	232	241	30	466	496	56	444	501	56	445	501	56	465	522
3125	Lawrence	17	253	270	17	263	280	4	519	524	9	540	548	9	541	550	9	577	586
3124	Cedarhurst	80	556	636	78	519	597	45	335	380	59	353	412	58	353	411	58	363	421
3123	Woodmere	48	597	645	56	630	686	30	617	647	41	686	727	41	685	726	40	692	732
3122	Hewlett	85	704	789	78	642	720	6	885	891	8	988	996	8	990	998	8	997	1,005
3121	Gibson	40	637	677	33	501	534	37	49	86	47	50	97	47	50	97	47	50	97
3097	Valley Stream	151	2,156	2,307	137	2,254	2,391	211	2,241	2,452	196	2,505	2,701	200	2,511	2,711	209	2,639	2,848
3096	Rosedale	21	1,276	1,297	21	1,058	1,079	155	741	896	211	946	1,157	217	949	1,166	222	1,091	1,313
3095	Laurelton	19	489	508	24	471	495	15	700	715	27	710	737	28	710	738	28	805	833
3094	Locust Manor	28	492	520	24	452	476	41	427	469	36	275	311	36	275	312	36	266	303
	Total	514	7,498	8,012	499	7,080	7,579	578	7,052	7,630	705	7,915	8,620	716	7,929	8,645	730	8,367	9,097
HEMPSTEAD BRANCH																			
3120	Hempstead	235	1,029	1,264	264	800	1,064	62	973	1,034	53	1,041	1,094	84	1,042	1,125	78	1,170	1,248
3119	Country Life Press	11	347	358	11	298	309	4	335	340	2	360	363	3	361	364	3	403	405
3118	Garden City	118	577	695	115	581	696	65	242	307	66	294	360	91	294	385	73	312	386
3117	Nassau Blvd	76	655	731	73	677	750	68	394	462	77	438	514	85	438	523	82	750	831
3116	Stewart Manor	15	834	849	18	771	789	44	1,031	1,076	36	1,089	1,125	68	1,090	1,158	69	1,640	1,708
3115	Floral Park	60	1,270	1,330	63	1,231	1,294	71	1,262	1,333	63	1,204	1,267	88	1,203	1,291	59	647	706
3114	Bellerose	10	444	454	8	516	524	92	726	818	96	532	628	116	599	716	106	693	799
3008	Queens Village	32	579	611	33	474	507	24	640	664	25	688	713	38	696	735	34	1,068	1,102
3007	Hollis	6	56	62	7	53	60	17	78	95	21	69	90	39	69	108	27	156	184
	Total	563	5,791	6,354	592	5,401	5,993	448	5,682	6,129	439	5,714	6,154	612	5,792	6,405	531	6,838	7,369

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
LONG BEACH BRANCH																			
3113	Long Beach	116	1,763	1,879	116	1,631	1,747	24	1,860	1,884	26	2,321	2,347	26	2,101	2,128	26	2,181	2,207
3112	Island Park	30	1,175	1,205	30	1,146	1,176	27	1,550	1,576	33	1,592	1,625	33	1,814	1,847	33	1,865	1,899
3111	Oceanside	47	1,361	1,408	70	1,264	1,334	38	793	832	47	671	718	48	1,255	1,303	49	1,155	1,204
3110	East Rockaway	37	431	468	62	474	536	7	926	933	8	1,397	1,404	8	816	823	8	962	970
3109	Centre Ave	23	518	541	13	489	502	20	250	269	24	299	324	25	299	324	25	310	335
3036	Lynbrook	202	1,568	1,770	198	1,473	1,671	116	1,445	1,562	120	1,460	1,580	122	1,462	1,585	123	1,562	1,685
	Total	455	6,816	7,271	489	6,477	6,966	233	6,823	7,056	259	7,740	7,999	263	7,747	8,010	264	8,035	8,299
MONTAUK BRANCH																			
3068	Montauk	11	4	15	11	5	16	1	0	1	3	0	3	3	0	3	3	0	3
3067	Amagansett	3	6	9	4	3	7	0	94	94	0	130	131	0	131	131	0	131	131
3066	East Hampton	25	2	27	25	16	41	7	35	42	15	46	61	15	47	62	14	47	61
3065	Bridgehampton	8	3	11	9	10	19	8	6	14	11	9	20	11	9	20	12	9	21
3064	Southampton	14	8	22	14	7	21	11	25	37	14	34	48	14	34	49	14	35	48
3063	Southampton Campus-L	3	0	3	3	0	3	11	0	12	14	0	15	14	0	15	14	0	14
3062	Hampton Bays	10	7	17	10	15	25	6	12	17	7	17	24	7	17	24	7	17	24
3061	Quogue	3	0	3	3	0	3	0	3	3	0	3	3	0	3	3	0	3	3
3060	Westhampton	10	1	11	11	8	19	9	16	26	13	22	35	13	22	35	13	22	35
3059	Speonk	7	41	48	8	66	74	2	35	37	2	78	79	2	75	76	2	79	81
3058	Center Moriches	0	19	19	1	11	12	2	21	22	3	10	13	3	14	17	3	9	12
3057	Mastic-Shirley	12	313	325	14	244	258	8	250	258	11	434	445	11	441	453	11	447	458
3056	Bellport	4	9	13	1	10	11	2	18	20	5	16	20	5	9	14	4	9	14
3055	Patchogue	66	657	723	72	469	541	40	416	456	54	660	714	54	677	731	54	674	728
3054	Sayville	62	425	487	90	559	649	20	548	568	27	976	1,004	28	927	955	27	1,025	1,052
3053	Oakdale	11	186	197	13	158	171	12	220	232	18	319	336	18	235	253	18	228	246
3052	Great River	1	71	72	0	79	79	18	79	96	21	88	109	26	288	314	20	150	170
3051	Islip	23	416	439	18	353	371	30	352	382	48	557	605	57	608	665	47	560	608
3050	Bay Shore	60	491	551	65	450	515	27	601	628	33	947	980	38	1,039	1,077	33	965	998
	Total	333	2,659	2,992	372	2,463	2,835	214	2,730	2,944	298	4,347	4,645	320	4,575	4,895	295	4,411	4,706

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
OYSTER BAY																			
3108	Oyster Bay	22	51	73	22	57	79	20	8	29	20	9	30	21	12	33	21	9	30
3107	Mill Neck	1	2	3	1	2	3	2	139	141	2	196	198	3	214	217	3	202	204
3106	Locust Valley	30	186	216	28	180	208	21	202	223	22	272	294	25	296	320	23	281	304
3105	Glen Cove	7	146	153	11	147	158	27	74	101	27	102	129	30	109	139	28	104	132
3104	Glen St	10	153	163	18	149	167	1	244	245	1	332	333	1	369	371	1	340	342
3103	Sea Cliff	13	199	212	11	188	199	52	182	234	47	245	292	65	277	341	51	251	302
3102	Glen Head	9	196	205	13	264	277	5	252	257	6	350	356	6	418	424	6	356	362
3101	Greenvale	14	93	107	12	82	94	9	165	173	7	238	245	10	258	268	7	242	249
3100	Roslyn	51	205	256	52	234	286	36	244	279	27	313	340	30	364	394	29	334	362
3099	Albertson	29	167	196	32	170	202	45	191	236	30	246	276	33	307	340	30	261	291
3098	East Williston	21	492	513	16	459	475	11	489	500	5	676	681	7	768	775	5	585	590
	Total	207	1,890	2,097	216	1,932	2,148	230	2,189	2,419	195	2,979	3,175	231	3,391	3,622	204	2,964	3,168
PORT JEFFERSON																			
3078	Port Jefferson	62	434	496	62	358	420	11	454	465	15	847	862	15	916	931	15	875	890
3077	Stony Brook	110	336	446	110	332	442	63	583	646	73	523	596	73	565	639	74	497	570
3076	St James	18	201	219	20	214	234	22	209	231	25	242	267	25	267	292	25	244	269
3075	Smithtown	39	485	524	42	490	532	53	575	628	61	783	844	62	831	892	61	786	848
3074	Kings Park	26	893	919	19	861	880	31	875	906	38	1,196	1,234	39	1,284	1,323	38	1,199	1,238
3073	Northport	65	1,133	1,198	75	1,041	1,116	50	1,125	1,175	62	1,222	1,284	63	1,316	1,379	62	1,214	1,276
3072	Greenlawn	13	388	401	10	424	434	39	590	630	48	29	77	49	80	130	51	22	73
3071	Huntington	394	4,485	4,879	273	4,664	4,937	109	3,910	4,019	122	7,177	7,299	127	7,738	7,865	122	6,789	6,911
3070	Cold Spring Harbor	36	1,010	1,046	37	1,036	1,073	20	780	800	24	885	908	24	695	720	24	1,178	1,202
3069	Syosset	217	2,009	2,226	206	2,352	2,558	173	2,533	2,707	203	3,093	3,297	210	3,080	3,290	205	3,452	3,657
3014	Hicksville	665	6,285	6,950	604	6,336	6,940	462	6,220	6,682	609	8,038	8,647	633	8,065	8,697	641	7,544	8,185
3013	Westbury	227	1,359	1,586	244	1,510	1,754	179	1,559	1,738	202	1,412	1,614	217	1,405	1,622	225	2,182	2,407
3012	Carle Place	29	297	326	33	296	329	477	211	688	504	248	752	541	248	789	476	20	496
3011	Mineola	810	2,509	3,319	641	2,287	2,928	376	1,852	2,227	399	2,354	2,753	410	2,387	2,797	463	2,197	2,660
3010	Merillon Ave	14	547	561	20	593	613	184	1,486	1,670	223	1,737	1,961	234	1,726	1,960	232	2,118	2,350
3009	New Hyde Park	65	1,152	1,217	81	1,187	1,268	193	1,770	1,963	187	2,287	2,474	190	2,289	2,479	198	3,019	3,217
	Total	2,790	23,523	26,313	2,477	23,981	26,458	2,443	24,732	27,176	2,794	32,073	34,869	2,911	32,893	35,804	2,914	33,334	36,248

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
PORT WASHINGTON																			
3090	Port Washington	206	2,467	2,673	206	2,429	2,635	152	2,332	2,483	145	2,769	2,914	182	2,771	2,953	146	2,831	2,977
3089	Plandome	31	478	509	28	468	496	23	227	250	27	263	290	33	266	299	27	269	296
3088	Manhasset	183	2,159	2,342	172	2,197	2,369	293	2,410	2,702	305	3,335	3,640	389	2,816	3,205	311	2,643	2,954
3087	Great Neck	455	2,694	3,149	419	3,015	3,434	484	3,031	3,515	404	3,195	3,599	582	3,720	4,302	417	4,510	4,928
3086	Little Neck	17	1,464	1,481	19	1,446	1,465	166	1,269	1,435	144	849	992	178	919	1,097	146	1,011	1,156
3085	Douglaston	30	1,014	1,044	30	1,140	1,170	24	1,479	1,502	27	1,767	1,794	40	1,768	1,808	28	1,943	1,972
3084	Bayside	84	3,073	3,157	87	3,263	3,350	119	3,695	3,814	123	2,080	2,204	136	2,135	2,271	136	2,439	2,576
3083	Auburndale	16	1,094	1,110	12	1,132	1,144	17	1,472	1,489	14	1,327	1,341	16	1,361	1,376	17	2,662	2,679
3082	Broadway	17	927	944	15	1,019	1,034	71	1,078	1,149	69	718	787	83	737	820	75	1,275	1,350
3081	Murray Hill	12	370	382	14	447	461	80	150	229	97	62	159	103	67	171	101	122	223
3080	Flushing	89	427	516	106	482	588	515	710	1,224	700	763	1,463	727	798	1,525	726	1,577	2,303
	Total	1,140	16,167	17,307	1,108	17,038	18,146	1,944	17,849	19,794	2,054	17,128	19,182	2,469	17,358	19,827	2,131	21,283	23,414
RONKONKOMA																			
3029	Greenport	8	7	15	8	3	11	15	19	34	18	22	40	18	22	41	18	22	41
3028	Southold	0	8	8	0	9	9	16	96	112	20	128	148	20	128	148	20	130	150
3027	Mattituck	2	6	8	2	8	10	19	27	46	23	16	39	24	16	40	23	16	39
3026	Riverhead	16	16	32	16	7	23	2	50	51	2	98	100	2	98	100	2	98	100
3025	Yaphank	0	14	14	0	5	5	14	6	20	18	10	28	18	10	28	18	10	28
3024	Medford	0	27	27	0	15	15	15	3	18	22	3	25	22	3	25	22	3	25
3023	Holtsville	1	11	12	1	4	5	46	152	198	58	242	300	59	254	313	58	252	310
3022	Ronkonkoma	251	5,003	5,254	251	5,430	5,681	59	5,029	5,088	73	6,881	6,953	74	6,915	6,989	73	6,791	6,864
3021	Central Islip	52	1,187	1,239	56	1,514	1,570	119	1,081	1,200	147	1,259	1,407	148	1,266	1,414	153	1,827	1,980
3020	Brentwood	95	1,152	1,247	83	1,155	1,238	98	1,546	1,644	102	3,042	3,143	104	3,007	3,111	123	1,938	2,061
3019	Deer Park	87	1,502	1,589	101	1,815	1,916	131	1,590	1,720	160	1,310	1,471	162	1,259	1,421	172	3,661	3,833
3018	Wyandanch	87	1,323	1,410	101	1,375	1,476	63	1,339	1,402	75	1,898	1,972	77	1,880	1,956	97	1,585	1,681
3017	Pine Lawn	0	0	0	0	0	0	31	0	31	17	0	17	17	0	17	28	0	28
3016	Farmingdale	114	881	995	111	987	1,098	277	1,157	1,435	300	1,415	1,715	307	1,417	1,723	315	1,502	1,817
3015	Bethpage	62	1,171	1,233	41	1,093	1,134	208	864	1,071	264	1,067	1,330	267	1,120	1,387	295	1,582	1,877
	Total	775	12,308	13,083	771	13,420	14,191	1,112	12,957	14,069	1,299	17,389	18,688	1,318	17,395	18,713	1,417	19,416	20,834

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
WEST HEMPSTEAD																			
3132	West Hempstead	6	189	195	6	226	232	13	209	223	18	198	216	13	198	211	18	224	242
3131	Hempstead Gardens	5	204	209	4	139	143	81	193	274	72	201	274	73	201	275	67	239	306
3130	Lakeview	4	297	301	4	302	306	5	267	273	6	288	294	6	289	296	6	316	322
3129	Malverne	11	565	576	10	524	534	8	523	531	8	581	589	9	582	590	9	658	667
3128	Westwood	3	347	350	2	345	347	21	438	459	22	450	472	22	452	474	22	507	529
3035	St Albans	0	40	40	0	39	39	20	79	99	27	46	73	28	46	73	33	218	251
	Total	29	1,642	1,671	26	1,575	1,601	150	1,709	1,859	154	1,765	1,919	151	1,768	1,919	156	2,162	2,318
LIRR TOTALS																			
LIRR Total W/O Terminal Zone		8,344	106,416	114,760	8,133	106,102	114,235	8,591	107,886	116,476	9,643	128,905	138,549	10,456	130,880	141,336	10,134	140,556	150,690
LIRR Total With Terminal Zone		113,231	113,776	227,007	112,843	113,574	226,417	113,043	113,715	226,758	134,195	134,979	269,175	135,875	137,228	273,103	147,975	148,780	296,754

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
METRO NORTH																			
HUDSON LINE																			
3227	Poughkeepsie	0	661	661	0	661	661	127	784	911	216	890	1,106	216	890	1,106	217	890	1,107
3226	New Hamburg	0	619	619	0	619	619	12	787	799	23	878	901	23	878	901	23	880	902
3225	Beacon	5	921	926	5	921	926	44	872	916	89	1,143	1,232	89	1,143	1,232	89	1,141	1,230
3224	Cold Spring	2	307	309	2	307	309	7	374	381	8	434	442	8	434	442	8	434	442
3223	Garrison	0	203	203	0	203	203	2	251	253	2	299	301	2	299	301	2	299	301
3222	Peekskill	35	888	923	35	888	923	81	926	1,007	113	1,521	1,634	113	1,521	1,634	113	1,519	1,632
3221	Montrose	1	223	224	1	223	224	40	140	179	0	0	0	0	0	0	0	0	0
3220	Crugers	23	118	141	23	118	141	36	139	175	0	0	0	0	0	0	0	0	0
3219	Croton-Harmon	368	2,935	3,303	368	2,935	3,303	90	3,003	3,093	92	2,789	2,881	92	2,789	2,881	92	2,787	2,879
3218	Ossining	15	816	831	15	816	831	231	794	1,024	257	885	1,142	257	885	1,143	257	885	1,143
3217	Scarborough	1	716	717	1	716	717	43	912	955	46	1,087	1,132	46	1,087	1,132	46	1,087	1,133
3216	Philipse Manor	1	311	312	1	311	312	72	153	225	82	178	260	82	178	259	83	178	261
3215	Tarrytown	65	1,652	1,717	65	1,652	1,717	127	1,801	1,928	101	1,099	1,201	102	1,101	1,203	102	1,100	1,202
3214	Irvington	32	602	634	32	602	634	23	729	751	23	855	878	23	855	878	23	855	878
3213	Ardsley	13	142	155	13	142	155	0	436	436	0	31	31	0	31	31	0	31	31
3212	Dobbs Ferry	20	870	890	20	870	890	132	711	842	130	842	972	130	841	972	131	842	972
3211	Hastings	15	869	884	15	869	884	171	819	990	173	950	1,123	173	949	1,122	174	950	1,123
3210	Greystone	0	518	518	0	518	518	66	622	687	63	169	232	63	169	232	63	169	232
3209	Glenwood	1	249	250	1	249	250	40	291	330	37	682	720	37	682	720	38	682	720
3208	Yonkers	68	440	508	68	440	508	218	805	1,023	202	531	734	202	531	734	203	531	734
3207	Ludlow	3	190	193	3	190	193	75	533	608	74	431	505	74	431	505	74	431	506
3206	Riverdale	5	480	485	5	480	485	51	776	827	45	563	608	46	563	609	48	563	611
3205	Spuyten Duyvil	6	628	634	6	628	634	37	397	433	38	415	452	38	414	452	40	415	455
3204	Marble Hill	134	56	190	134	56	190	1,343	698	2,041	984	704	1,688	984	704	1,688	1,000	706	1,706
3203	University Heights	15	10	25	15	10	25	91	65	155	75	110	184	75	110	184	80	110	190
3202	Morris Heights	14	66	80	14	66	80	28	44	72	15	97	112	15	97	112	16	97	114
	Total	842	15,490	16,332	842	15,490	16,332	3,184	17,859	21,043	2,888	17,583	20,470	2,888	17,583	20,471	2,920	17,581	20,501

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
HARLEM LINE																			
3259	Dover Plains	0	50	50	0	50	50	1	115	116	1	198	199	1	198	199	1	198	199
3258	Harlem Valley-Wingda	1	18	19	1	18	19	1	74	75	2	173	175	2	173	175	2	173	175
3257	Pawling	0	78	78	0	78	78	10	175	185	48	349	396	48	348	396	48	348	396
3256	Patterson	1	45	46	1	45	46	8	10	18	11	23	33	11	23	33	10	23	33
3255	Brewster North	27	568	595	27	568	595	2	598	600	3	835	838	3	835	838	3	835	838
3254	Brewster	1	774	775	1	774	775	69	354	423	94	493	587	94	493	587	94	493	587
3253	Croton Falls	9	322	331	9	322	331	3	715	718	9	943	952	9	943	952	9	943	952
3252	Purdy's	1	280	281	1	280	281	47	295	342	62	404	466	62	404	466	62	404	466
3251	Golden's Bridge	4	754	758	4	754	758	1	984	985	1	1,214	1,215	1	1,214	1,215	1	1,214	1,215
3250	Katonah	11	791	802	11	791	802	8	457	465	9	509	518	9	509	518	9	509	518
3249	Bedford Hills	10	496	506	10	496	506	112	528	640	139	589	729	140	589	729	140	589	730
3248	Mount Kisco	33	900	933	33	900	933	183	833	1,016	210	932	1,142	210	931	1,142	211	931	1,142
3247	Chappaqua	13	1,645	1,658	13	1,645	1,658	9	1,334	1,344	11	2,125	2,136	11	2,125	2,136	11	2,125	2,136
3246	Pleasantville	18	522	540	18	522	540	88	680	767	90	854	944	90	854	944	90	854	944
3245	Hawthorne	11	404	415	11	404	415	116	257	372	116	319	435	116	319	435	116	319	435
3244	Valhalla	5	185	190	5	185	190	63	208	271	70	254	324	70	254	324	70	254	324
3243	North White Plains	15	1,429	1,444	15	1,429	1,444	51	1,215	1,267	47	1,497	1,544	47	1,496	1,544	48	1,497	1,545
3242	White Plains	162	2,552	2,714	162	2,552	2,714	1,080	2,842	3,923	1,305	3,660	4,965	1,305	3,660	4,965	1,314	3,660	4,974
3241	Hartsdale	9	2,246	2,255	9	2,246	2,255	31	2,684	2,715	53	1,985	2,038	53	1,985	2,038	53	1,985	2,038
3240	Scarsdale	22	3,019	3,041	22	3,019	3,041	144	2,537	2,681	173	5,170	5,343	173	5,170	5,343	174	5,170	5,344
3239	Crestwood	3	1,363	1,366	3	1,363	1,366	85	2,059	2,145	111	2,678	2,788	111	2,678	2,788	109	2,676	2,785
3238	Tuckahoe	7	1,007	1,014	7	1,007	1,014	15	1,473	1,488	26	2,094	2,120	26	2,094	2,120	29	2,094	2,123
3237	Bronxville	17	2,011	2,028	17	2,011	2,028	97	1,883	1,980	121	2,574	2,696	122	2,574	2,696	122	2,573	2,695
3236	Fleetwood	5	1,880	1,885	5	1,880	1,885	45	1,587	1,631	58	2,375	2,433	58	2,375	2,433	58	2,374	2,432
3235	Mount Vernon West	115	833	948	115	833	948	167	1,006	1,173	184	390	574	184	390	574	185	390	574
3234	Wakefield	1	218	219	1	218	219	42	395	437	67	531	598	67	531	598	67	531	599
3233	Woodlawn	15	633	648	15	633	648	57	1,342	1,399	89	1,447	1,536	89	1,447	1,536	91	1,446	1,537
3232	Williams Bridge	26	92	118	26	92	118	147	593	740	253	907	1,161	253	907	1,160	262	907	1,168
3231	Botanical Garden	118	241	359	118	241	359	73	184	257	105	464	570	105	465	570	108	465	573
3230	Fordham	147	122	269	147	122	269	512	310	822	663	653	1,316	663	652	1,315	672	653	1,325
3229	Tremont	5	1	6	5	1	6	41	139	181	240	257	497	240	257	497	250	259	509
3228	Melrose	5	4	9	5	4	9	317	206	524	743	407	1,150	743	407	1,150	753	410	1,163
	Total	817	25,483	26,300	817	25,483	26,300	3,629	28,071	31,700	5,114	37,303	42,417	5,115	37,300	42,415	5,172	37,300	42,472

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
NEW HAVEN LINE																			
3297	Danbury	0	95	95	0	95	95	184	53	237	209	47	256	209	47	256	209	47	256
3296	Bethel	0	112	112	0	112	112	61	415	477	58	454	511	58	454	511	58	454	511
3295	Redding	1	60	61	1	60	61	2	238	240	2	286	289	2	286	288	2	287	289
3294	Branchville	5	175	180	5	175	180	11	99	110	10	112	122	10	112	122	10	112	122
3293	Cannondale	0	105	105	0	105	105	21	433	454	25	504	528	25	504	528	25	504	528
3291	Wilton (Kent Rd)	23	220	243	23	220	243	17	6	23	0	0	0	0	0	0	0	0	0
3290	Merritt 7	12	108	120	12	108	120	125	134	259	145	158	303	145	158	303	145	158	303
3289	New Canaan	0	984	984	0	984	984	44	944	988	71	839	910	71	839	910	71	839	910
3288	Talmadge Hill	1	334	335	1	334	335	7	782	789	12	1,394	1,406	12	1,394	1,406	12	1,394	1,406
3287	Springdale	0	318	318	0	318	318	59	194	253	94	264	358	94	264	358	94	264	358
3286	Glenbrook	1	348	349	1	348	349	114	543	657	179	762	941	179	762	941	179	762	942
3285	NewHaven	0	990	990	0	990	990	31	1,439	1,470	44	1,974	2,018	44	1,974	2,018	44	1,974	2,018
3284	Milford	17	618	635	17	618	635	5	17	23	6	19	24	6	19	24	6	19	24
3283	Stratford	11	546	557	11	546	557	232	522	755	256	697	953	256	697	953	256	697	953
3282	Bridgeport	121	388	509	121	388	509	530	607	1,137	585	1,145	1,730	585	1,145	1,730	585	1,145	1,730
3281	Fairfield	87	1,989	2,076	87	1,989	2,076	68	1,776	1,844	84	2,819	2,903	84	2,818	2,903	84	2,818	2,903
3280	Southport	9	151	160	9	151	160	88	310	398	103	3	106	103	3	106	103	3	106
3279	Green's Farms	13	551	564	13	551	564	10	602	612	12	742	754	12	742	754	12	742	754
3278	Westport	90	1,822	1,912	90	1,822	1,912	141	1,771	1,912	195	2,269	2,465	195	2,269	2,465	195	2,269	2,465
3277	East Norwalk	47	486	533	47	486	533	135	598	733	211	798	1,009	211	798	1,009	211	798	1,009
3276	South Norwalk	182	763	945	182	763	945	184	742	925	261	1,018	1,279	261	1,018	1,279	261	1,018	1,279
3275	Rowayton	5	525	530	5	525	530	29	65	94	32	89	121	32	89	121	32	89	121
3274	Darien	27	1,169	1,196	27	1,169	1,196	35	1,643	1,677	46	2,274	2,320	46	2,274	2,320	46	2,274	2,320
3273	Noroton Heights	2	965	967	2	965	967	148	940	1,088	175	1,315	1,491	175	1,315	1,491	175	1,315	1,491
3272	Stamford	976	2,572	3,548	976	2,572	3,548	2,212	2,656	4,869	3,661	3,347	7,007	3,661	3,347	7,007	3,662	3,347	7,008
3271	Old Greenwich	12	830	842	12	830	842	219	629	848	300	848	1,148	300	848	1,148	300	848	1,148
3270	Riverside	5	528	533	5	528	533	38	492	530	52	637	689	52	637	689	52	637	689
3269	Cos Cob	29	707	736	29	707	736	18	1,257	1,275	23	1,558	1,581	23	1,558	1,581	23	1,557	1,581
3268	Greenwich	214	1,838	2,052	214	1,838	2,052	403	896	1,299	662	1,096	1,758	662	1,096	1,758	662	1,096	1,758
3267	Port Chester	54	1,065	1,119	54	1,065	1,119	129	1,908	2,037	243	2,346	2,589	243	2,346	2,589	247	2,346	2,592
3266	Rye	26	1,643	1,669	26	1,643	1,669	132	1,713	1,845	162	2,048	2,211	162	2,048	2,211	163	2,048	2,211
3265	Harrison	30	1,409	1,439	30	1,409	1,439	55	1,587	1,642	78	1,853	1,931	78	1,853	1,931	78	1,853	1,932
3264	Mamaroneck	36	1,329	1,365	36	1,329	1,365	86	969	1,055	118	1,051	1,169	118	1,051	1,169	119	1,051	1,170
3263	Larchmont	28	2,641	2,669	28	2,641	2,669	81	2,291	2,372	102	2,567	2,669	102	2,567	2,669	102	2,567	2,669
3262	New Rochelle	86	1,653	1,739	86	1,653	1,739	171	1,968	2,139	214	2,052	2,266	214	2,052	2,266	215	2,052	2,266
3261	Pelham	14	1,769	1,783	14	1,769	1,783	65	1,761	1,826	75	1,929	2,004	75	1,929	2,004	76	1,929	2,004
3260	Mount Vernon	80	901	981	80	901	981	101	1,418	1,519	112	1,459	1,571	112	1,459	1,571	113	1,459	1,571
3505	Fordham	232	2	234	232	2	234	209	249	458	410	296	706	410	296	707	416	297	713
	Total	2,476	32,709	35,185	2,476	32,709	35,185	6,199	34,668	40,867	9,028	43,068	52,097	9,028	43,068	52,096	9,043	43,067	52,110

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
MANHATTAN																			
3500	125th St	864	0	864	864	0	864	2,454	774	3,228	2,724	883	3,606	2,725	815	3,540	2,724	779	3,503
3201	125th St			0			0	250	151	401	200	86	287	200	155	356	200	193	394
3200	NYC-Grand Central	66,455	0	66,455	66,455	0	66,455	68,014	2,340	70,354	82,423	3,083	85,506	82,419	3,084	85,503	82,239	3,007	85,245
	Total	67,319	0	67,319	67,319	0	67,319	70,717	3,266	73,983	85,347	4,052	89,399	85,345	4,054	89,399	85,163	3,979	89,142
Total MNCRR W/O Manhattan		4,135	73,682	77,817	4,135	73,682	77,817	13,012	80,598	93,610	17,030	97,954	114,983	17,031	97,951	114,982	17,134	97,948	115,083
Total MNCRR With Manhattan		71,454	73,682	145,136	71,454	73,682	145,136	83,729	83,864	167,592	102,376	102,006	204,382	102,376	102,005	204,380	102,297	101,927	204,225

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
CITY TERMINAL ZONE																			
3000	New York-Penn Station	84,811	3,269	88,080	86,630	3,269	89,899	85,415	3,772	89,187	109,481	4,479	113,959	105,751	4,502	110,253	61,504	4,555	66,059
3807	New York-GCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65,043	1,828	66,872
3002	Hunterspoint Ave	3,457	0	3,457	2,890	0	2,890	3,263	0	3,263	3,621	28	3,649	7,625	28	7,653	630	29	659
3001	Long Island City	195	0	195	240	0	240	140	3	143	46	0	46	138	0	138	43	0	43
3091	Flatbush Ave	11,935	475	12,410	10,291	475	10,766	10,499	598	11,097	12,060	484	12,544	12,966	487	13,453	10,438	523	10,960
	Subtotal	100,398	3,744	104,142	100,051	3,744	103,795	99,318	4,373	103,691	125,208	4,990	130,198	126,480	5,018	131,498	137,658	6,935	144,593
3806	Jamaica Penn Station	3,582	2,308	5,890	3,538	2,292	5,830	3,131	964	4,095	4,298	1,166	5,465	4,286	1,164	5,450	4,634	1,581	6,215
3003	Woodside	659	495	1,154	802	521	1,323	1,077	250	1,327	2,084	215	2,299	1,760	219	1,979	943	213	1,156
3808	Sunnyside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,193	43	2,236
3004	Forest Hills	62	352	414	58	433	491	272	41	313	436	59	495	448	57	505	446	77	523
3005	Kew Gardens	30	447	477	39	467	506	206	89	295	346	39	385	347	40	386	381	45	425
3092	Nostrand Ave	156	14	170	105	14	119	175	49	224	213	38	251	215	38	253	212	41	252
3093	East New York			0	117	1	118	274	64	337	324	74	399	331	75	405	326	107	432
	Subtotal	4,489	3,616	8,105	4,659	3,728	8,387	5,134	1,457	6,591	7,701	1,592	9,293	7,386	1,592	8,977	9,134	2,105	11,239
	Total	104,887	7,360	112,247	104,710	7,472	112,182	104,452	5,830	110,282	132,909	6,582	139,491	133,866	6,609	140,475	146,792	9,040	155,832
BABYLON BRANCH																			
3049	Babylon	230	3,325	3,555	195	3,265	3,460	101	2,800	2,901	148	3,933	4,081	164	4,390	4,554	145	3,335	3,480
3048	Lindenhurst	97	1,526	1,623	91	1,278	1,369	56	1,230	1,286	71	2,208	2,279	73	1,909	1,982	88	3,146	3,234
3047	Copiague	150	1,015	1,165	145	1,001	1,146	48	1,186	1,235	69	1,862	1,931	72	1,866	1,937	82	2,022	2,104
3046	Amityville	162	831	993	210	727	937	180	1,005	1,185	234	1,559	1,793	237	1,563	1,800	240	1,701	1,941
3045	Massapequa Park	52	1,666	1,718	50	1,481	1,531	32	1,817	1,849	43	2,271	2,314	43	2,276	2,319	48	2,583	2,631
3044	Massapequa	91	2,708	2,799	90	2,522	2,612	60	2,181	2,240	78	2,718	2,796	80	2,725	2,805	106	2,646	2,752
3043	Seaford	63	1,566	1,629	58	1,435	1,493	53	1,773	1,825	67	2,133	2,200	67	2,138	2,206	60	2,079	2,139
3042	Wantagh	64	2,788	2,852	53	2,739	2,792	49	2,233	2,282	61	2,708	2,769	63	2,695	2,758	66	2,591	2,658
3041	Bellmore	75	2,800	2,875	92	2,698	2,790	65	2,295	2,360	79	2,875	2,954	77	2,880	2,957	87	3,028	3,116
3040	Merrick	55	2,827	2,882	70	2,812	2,882	126	2,535	2,661	149	3,133	3,282	150	3,138	3,288	161	3,398	3,559
3039	Freeport	195	1,642	1,837	200	1,672	1,872	121	2,087	2,208	140	2,565	2,705	141	2,568	2,709	155	2,693	2,849
3038	Baldwin	97	3,014	3,111	114	2,914	3,028	73	3,125	3,198	90	3,834	3,924	91	3,841	3,932	105	4,489	4,594
3037	Rockville Centre	207	2,414	2,621	215	2,191	2,406	275	1,895	2,170	314	2,072	2,386	316	2,072	2,388	339	2,189	2,528
	Total	1,538	28,122	29,660	1,583	26,735	28,318	1,236	26,162	27,400	1,541	33,872	35,413	1,574	34,061	35,635	1,683	35,900	37,583

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
FAR ROCKAWAY BRANCH																			
3127	Far Rockaway	16	113	129	22	58	80	5	70	75	17	442	459	17	444	461	18	442	460
3126	Inwood	9	225	234	9	232	241	30	466	496	59	467	526	59	468	527	59	488	547
3125	Lawrence	17	253	270	17	263	280	4	519	524	9	560	569	9	562	571	9	599	607
3124	Cedarhurst	80	556	636	78	519	597	45	335	380	61	370	431	61	370	431	62	379	442
3123	Woodmere	48	597	645	56	630	686	30	617	647	43	714	757	43	713	756	42	719	761
3122	Hewlett	85	704	789	78	642	720	6	885	891	8	1,030	1,038	8	1,031	1,039	8	1,038	1,046
3121	Gibson	40	637	677	33	501	534	37	49	86	50	52	101	50	52	101	50	52	101
3097	Valley Stream	151	2,156	2,307	137	2,254	2,391	211	2,241	2,452	206	2,622	2,827	208	2,627	2,835	230	2,761	2,991
3096	Rosedale	21	1,276	1,297	21	1,058	1,079	155	741	896	228	998	1,226	235	1,000	1,235	242	1,150	1,392
3095	Laurelton	19	489	508	24	471	495	15	700	715	29	756	785	30	755	785	31	855	886
3094	Locust Manor	28	492	520	24	452	476	41	427	469	38	287	325	39	287	326	39	276	315
	Total	514	7,498	8,012	499	7,080	7,579	578	7,052	7,630	748	8,298	9,045	759	8,308	9,067	790	8,758	9,549
HEMPSTEAD BRANCH																			
3120	Hempstead	235	1,029	1,264	264	800	1,064	62	973	1,034	88	1,098	1,186	88	1,099	1,187	97	1,233	1,330
3119	Country Life Press	11	347	358	11	298	309	4	335	340	3	381	384	3	382	385	3	425	429
3118	Garden City	118	577	695	115	581	696	65	242	307	96	314	410	96	314	410	101	333	434
3117	Nassau Blvd	76	655	731	73	677	750	68	394	462	90	469	559	90	469	559	91	800	891
3116	Stewart Manor	15	834	849	18	771	789	44	1,031	1,076	73	1,161	1,234	73	1,162	1,235	99	1,702	1,802
3115	Floral Park	60	1,270	1,330	63	1,231	1,294	71	1,262	1,333	94	1,274	1,368	94	1,275	1,370	82	743	824
3114	Bellerose	10	444	454	8	516	524	92	726	818	121	637	758	121	637	758	119	775	893
3008	Queens Village	32	579	611	33	474	507	24	640	664	39	730	769	41	740	781	49	1,132	1,181
3007	Hollis	6	56	62	7	53	60	17	78	95	40	74	114	41	74	115	45	165	210
	Total	563	5,791	6,354	592	5,401	5,993	448	5,682	6,129	644	6,138	6,782	647	6,154	6,800	686	7,307	7,993

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
LONG BEACH BRANCH																			
3113	Long Beach	116	1,763	1,879	116	1,631	1,747	24	1,860	1,884	27	2,521	2,548	28	2,198	2,226	27	2,282	2,309
3112	Island Park	30	1,175	1,205	30	1,146	1,176	27	1,550	1,576	35	1,585	1,620	35	1,910	1,945	36	1,964	2,000
3111	Oceanside	47	1,361	1,408	70	1,264	1,334	38	793	832	51	669	720	51	1,342	1,393	53	1,251	1,304
3110	East Rockaway	37	431	468	62	474	536	7	926	933	8	1,507	1,515	8	837	846	9	977	985
3109	Centre Ave	23	518	541	13	489	502	20	250	269	26	316	342	27	316	343	27	328	355
3036	Lynbrook	202	1,568	1,770	198	1,473	1,671	116	1,445	1,562	127	1,524	1,651	128	1,526	1,654	141	1,633	1,775
	Total	455	6,816	7,271	489	6,477	6,966	233	6,823	7,056	274	8,123	8,397	277	8,129	8,407	293	8,435	8,728
MONTAUK BRANCH																			
3068	Montauk	11	4	15	11	5	16	1	0	1	3	0	3	3	0	3	3	0	3
3067	Amagansett	3	6	9	4	3	7	0	94	94	0	153	153	0	154	154	0	153	153
3066	East Hampton	25	2	27	25	16	41	7	35	42	17	52	69	17	53	70	15	53	68
3065	Bridgehampton	8	3	11	9	10	19	8	6	14	13	10	23	13	10	23	13	10	23
3064	Southampton	14	8	22	14	7	21	11	25	37	17	37	54	17	37	54	17	38	54
3063	Southampton Campus-L	3	0	3	3	0	3	11	0	12	17	0	17	17	0	17	17	0	17
3062	Hampton Bays	10	7	17	10	15	25	6	12	17	8	19	28	8	19	28	8	19	28
3061	Quogue	3	0	3	3	0	3	0	3	3	0	3	3	0	3	3	0	3	3
3060	Westhampton	10	1	11	11	8	19	9	16	26	15	24	39	15	24	39	14	24	39
3059	Speonk	7	41	48	8	66	74	2	35	37	2	86	88	2	83	85	2	88	90
3058	Center Moriches	0	19	19	1	11	12	2	21	22	3	12	15	3	15	19	3	10	14
3057	Mastic-Shirley	12	313	325	14	244	258	8	250	258	13	497	510	13	504	518	13	511	524
3056	Bellport	4	9	13	1	10	11	2	18	20	5	18	24	5	10	18	5	10	16
3055	Patchogue	66	657	723	72	469	541	40	416	456	63	731	794	63	750	813	63	747	810
3054	Sayville	62	425	487	90	559	649	20	548	568	31	1,080	1,111	32	1,029	1,061	31	1,137	1,168
3053	Oakdale	11	186	197	13	158	171	12	220	232	20	334	355	21	264	285	20	255	275
3052	Great River	1	71	72	0	79	79	18	79	96	24	119	143	30	316	346	23	164	187
3051	Islip	23	416	439	18	353	371	30	352	382	55	617	673	67	674	740	55	620	676
3050	Bay Shore	60	491	551	65	450	515	27	601	628	38	1,049	1,088	44	1,152	1,196	37	1,070	1,108
	Total	333	2,659	2,992	372	2,463	2,835	214	2,730	2,944	346	4,845	5,190	370	5,100	5,470	342	4,915	5,258

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
OYSTER BAY																			
3108	Oyster Bay	22	51	73	22	57	79	20	8	29	21	10	31	22	14	36	22	9	31
3107	Mill Neck	1	2	3	1	2	3	2	139	141	3	207	210	3	226	229	3	213	216
3106	Locust Valley	30	186	216	28	180	208	21	202	223	24	284	308	26	310	336	24	294	318
3105	Glen Cove	7	146	153	11	147	158	27	74	101	29	108	137	32	115	147	30	110	140
3104	Glen St	10	153	163	18	149	167	1	244	245	1	349	350	2	388	390	1	358	359
3103	Sea Cliff	13	199	212	11	188	199	52	182	234	50	256	306	69	289	357	54	262	316
3102	Glen Head	9	196	205	13	264	277	5	252	257	6	380	386	7	453	460	7	387	393
3101	Greenvale	14	93	107	12	82	94	9	165	173	7	260	267	11	282	293	7	265	272
3100	Roslyn	51	205	256	52	234	286	36	244	279	28	327	355	32	379	411	31	347	378
3099	Albertson	29	167	196	32	170	202	45	191	236	32	257	289	34	321	355	32	272	304
3098	East Williston	21	492	513	16	459	475	11	489	500	5	707	713	8	802	810	6	612	618
	Total	207	1,890	2,097	216	1,932	2,148	230	2,189	2,419	207	3,145	3,352	244	3,579	3,823	217	3,130	3,347
PORT JEFFERSON																			
3078	Port Jefferson	62	434	496	62	358	420	11	454	465	17	965	982	17	1,023	1,040	17	960	977
3077	Stony Brook	110	336	446	110	332	442	63	583	646	85	566	650	85	633	718	86	572	658
3076	St James	18	201	219	20	214	234	22	209	231	28	270	298	28	298	327	29	272	301
3075	Smithtown	39	485	524	42	490	532	53	575	628	70	867	937	70	920	990	70	870	940
3074	Kings Park	26	893	919	19	861	880	31	875	906	43	1,326	1,370	44	1,427	1,471	44	1,330	1,374
3073	Northport	65	1,133	1,198	75	1,041	1,116	50	1,125	1,175	70	1,347	1,417	71	1,468	1,539	71	1,334	1,405
3072	Greenlawn	13	388	401	10	424	434	39	590	630	56	33	89	56	89	146	57	24	81
3071	Huntington	394	4,485	4,879	273	4,664	4,937	109	3,910	4,019	141	7,929	8,070	143	8,532	8,675	149	7,501	7,650
3070	Cold Spring Harbor	36	1,010	1,046	37	1,036	1,073	20	780	800	27	968	995	27	764	791	29	1,292	1,321
3069	Syosset	217	2,009	2,226	206	2,352	2,558	173	2,533	2,707	223	3,252	3,475	226	3,237	3,463	242	3,629	3,871
3014	Hicksville	665	6,285	6,950	604	6,336	6,940	462	6,220	6,682	662	8,413	9,075	687	8,443	9,130	721	7,862	8,582
3013	Westbury	227	1,359	1,586	244	1,510	1,754	179	1,559	1,738	225	1,476	1,701	230	1,468	1,698	254	2,330	2,585
3012	Carle Place	29	297	326	33	296	329	477	211	688	559	261	820	567	261	828	537	23	559
3011	Mineola	810	2,509	3,319	641	2,287	2,928	376	1,852	2,227	423	2,464	2,887	437	2,497	2,935	515	2,298	2,812
3010	Merillon Ave	14	547	561	20	593	613	184	1,486	1,670	247	1,846	2,093	252	1,835	2,086	273	2,253	2,525
3009	New Hyde Park	65	1,152	1,217	61	1,187	1,268	193	1,770	1,963	201	2,443	2,644	205	2,446	2,651	251	3,269	3,520
	Total	2,790	23,523	26,313	2,477	23,981	26,458	2,443	24,732	27,176	3,077	34,425	37,502	3,146	35,342	38,488	3,344	35,818	39,163

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
PORT WASHINGTON																			
3090	Port Washington	206	2,467	2,673	206	2,429	2,635	152	2,332	2,483	187	2,903	3,091	187	2,904	3,091	201	2,967	3,167
3089	Plandome	31	478	509	28	468	496	23	227	250	34	279	313	34	279	313	37	287	324
3088	Manhasset	183	2,159	2,342	172	2,197	2,369	293	2,410	2,702	408	3,489	3,897	408	2,939	3,347	446	2,847	3,292
3087	Great Neck	455	2,694	3,149	419	3,015	3,434	484	3,031	3,515	602	3,370	3,971	602	3,913	4,515	675	4,656	5,331
3086	Little Neck	17	1,464	1,481	19	1,446	1,465	166	1,269	1,435	183	984	1,166	183	963	1,146	200	1,165	1,366
3085	Douglaston	30	1,014	1,044	30	1,140	1,170	24	1,479	1,502	42	1,857	1,899	42	1,839	1,881	50	2,037	2,087
3084	Bayside	84	3,073	3,157	87	3,263	3,350	119	3,695	3,814	146	2,246	2,392	147	2,228	2,374	181	2,617	2,798
3083	Auburndale	16	1,094	1,110	12	1,132	1,144	17	1,472	1,489	17	1,460	1,477	17	1,442	1,458	22	2,850	2,872
3082	Broadway	17	927	944	15	1,019	1,034	71	1,078	1,149	89	785	874	89	760	849	99	1,366	1,465
3081	Murray Hill	12	370	382	14	447	461	80	150	229	109	74	183	110	72	182	120	143	263
3080	Flushing	89	427	516	106	482	588	515	710	1,224	771	844	1,614	767	850	1,617	814	1,704	2,519
	Total	1,140	16,167	17,307	1,108	17,038	18,146	1,944	17,849	19,794	2,588	18,289	20,877	2,585	18,189	20,774	2,845	22,639	25,484
RONKONKOMA																			
3029	Greenport	8	7	15	8	3	11	15	19	34	21	26	47	21	26	47	22	26	47
3028	Southold	0	8	8	0	9	9	16	96	112	24	143	166	24	143	166	24	146	169
3027	Mattituck	2	6	8	2	8	10	19	27	46	28	18	46	28	18	46	28	18	46
3026	Riverhead	16	16	32	16	7	23	2	50	51	3	111	113	3	111	114	3	111	113
3025	Yaphank	0	14	14	0	5	5	14	6	20	21	11	32	21	11	32	21	11	32
3024	Medford	0	27	27	0	15	15	15	3	18	25	4	29	25	4	29	25	4	29
3023	Holtsville	1	11	12	1	4	5	46	152	198	68	267	335	68	282	350	67	279	347
3022	Ronkonkoma	251	5,003	5,254	251	5,430	5,681	59	5,029	5,088	82	7,679	7,761	83	7,714	7,797	81	7,583	7,664
3021	Central Islip	52	1,187	1,239	56	1,514	1,570	119	1,081	1,200	169	1,453	1,623	169	1,461	1,631	184	2,045	2,229
3020	Brentwood	95	1,152	1,247	83	1,155	1,238	98	1,546	1,644	119	3,322	3,441	119	3,271	3,390	150	2,133	2,283
3019	Deer Park	87	1,502	1,589	101	1,815	1,916	131	1,590	1,720	183	1,472	1,655	184	1,429	1,613	197	4,073	4,270
3018	Wyandanch	87	1,323	1,410	101	1,375	1,476	63	1,339	1,402	87	2,115	2,202	87	2,097	2,184	116	1,777	1,893
3017	Pine Lawn	0	0	0	0	0	0	31	0	31	19	0	19	19	0	19	42	0	42
3016	Farmingdale	114	881	995	111	987	1,098	277	1,157	1,435	342	1,508	1,851	343	1,511	1,855	362	1,601	1,963
3015	Bethpage	62	1,171	1,233	41	1,093	1,134	208	864	1,071	295	1,120	1,415	298	1,175	1,474	343	1,663	2,006
	Total	775	12,308	13,083	771	13,420	14,191	1,112	12,957	14,069	1,486	19,249	20,735	1,493	19,254	20,746	1,664	21,470	23,134

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
WEST HEMPSTEAD																			
3132	West Hempstead	6	189	195	6	226	232	13	209	223	13	206	219	13	207	220	13	233	246
3131	Hempstead Gardens	5	204	209	4	139	143	81	193	274	78	211	288	78	211	288	72	249	322
3130	Lakeview	4	297	301	4	302	306	5	267	273	7	303	309	7	304	310	7	332	338
3129	Malverne	11	565	576	10	524	534	8	523	531	9	612	621	9	613	622	10	692	701
3128	Westwood	3	347	350	2	345	347	21	438	459	23	469	492	24	470	493	24	526	550
3035	St Albans	0	40	40	0	39	39	20	79	99	29	49	78	29	48	77	35	224	260
	Total	29	1,642	1,671	26	1,575	1,601	150	1,709	1,859	158	1,849	2,007	160	1,852	2,012	161	2,257	2,418
LIRR TOTALS																			
LIRR Total W/O Terminal Zone		8,344	106,416	114,760	8,133	106,102	114,235	8,591	107,886	116,476	11,069	138,232	149,301	11,254	139,967	151,221	12,026	150,630	162,656
LIRR Total With Terminal Zone		113,231	113,776	227,007	112,843	113,574	226,417	113,043	113,715	226,758	143,978	144,814	288,792	145,120	146,576	291,696	158,817	159,670	318,488

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
METRO NORTH																			
HUDSON LINE																			
3227	Poughkeepsie	0	661	661	0	661	661	127	784	911	194	1,100	1,294	193	1,100	1,293	195	1,101	1,295
3226	New Hamburg	0	619	619	0	619	619	12	787	799	22	1,080	1,102	22	1,080	1,102	22	1,084	1,106
3225	Beacon	5	921	926	5	921	926	44	872	916	94	1,305	1,399	94	1,305	1,399	94	1,305	1,399
3224	Cold Spring	2	307	309	2	307	309	7	374	381	10	455	464	10	455	464	10	455	465
3223	Garrison	0	203	203	0	203	203	2	251	253	2	315	317	2	315	317	2	315	317
3222	Peekskill	35	888	923	35	888	923	81	926	1,007	127	1,583	1,710	127	1,581	1,708	127	1,581	1,708
3221	Montrose	1	223	224	1	223	224	40	140	179	0	0	0	0	0	0	0	0	0
3220	Crugers	23	118	141	23	118	141	36	139	175	0	0	0	0	0	0	0	0	0
3219	Croton-Harmon	368	2,935	3,303	368	2,935	3,303	90	3,003	3,093	93	2,921	3,014	93	2,921	3,014	93	2,920	3,013
3218	Ossining	15	816	831	15	816	831	231	794	1,024	268	925	1,193	268	925	1,194	269	926	1,194
3217	Scarborough	1	716	717	1	716	717	43	912	955	47	1,138	1,185	47	1,138	1,185	47	1,139	1,186
3216	Philipse Manor	1	311	312	1	311	312	72	153	225	88	188	275	87	188	275	88	189	277
3215	Tarrytown	65	1,652	1,717	65	1,652	1,717	127	1,801	1,928	108	1,137	1,245	108	1,137	1,245	109	1,135	1,244
3214	Irvington	32	602	634	32	602	634	23	729	751	24	890	914	24	890	914	24	890	914
3213	Ardsley	13	142	155	13	142	155	0	436	436	0	32	32	0	32	32	0	32	32
3212	Dobbs Ferry	20	870	890	20	870	890	132	711	842	133	873	1,006	133	873	1,006	133	874	1,007
3211	Hastings	15	869	884	15	869	884	171	819	990	176	981	1,157	176	981	1,157	176	982	1,159
3210	Greystone	0	518	518	0	518	518	66	622	687	65	175	241	65	175	241	66	175	241
3209	Glenwood	1	249	250	1	249	250	40	291	330	39	707	747	39	707	747	40	708	748
3208	Yonkers	68	440	508	68	440	508	218	805	1,023	207	546	753	207	546	753	207	546	753
3207	Ludlow	3	190	193	3	190	193	75	533	608	80	446	526	80	446	526	80	446	527
3206	Riverdale	5	480	485	5	480	485	51	776	827	48	602	650	48	602	650	51	603	654
3205	Spuyten Duyvil	6	628	634	6	628	634	37	397	433	40	442	482	40	442	482	43	444	486
3204	Marble Hill	134	56	190	134	56	190	1,343	698	2,041	1,014	683	1,698	1,014	683	1,697	1,029	686	1,715
3203	University Heights	15	10	25	15	10	25	91	65	155	80	118	199	80	118	199	86	119	205
3202	Morris Heights	14	66	80	14	66	80	28	44	72	16	105	121	16	104	121	17	106	123
	Total	842	15,490	16,332	842	15,490	16,332	3,184	17,859	21,043	2,975	18,747	21,723	2,975	18,744	21,720	3,008	18,760	21,768

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
HARLEM LINE																			
3259	Dover Plains	0	50	50	0	50	50	1	115	116	2	251	253	2	251	253	2	251	253
3258	Harlem Valley-Wingda	1	18	19	1	18	19	1	74	75	3	209	212	3	209	212	3	209	212
3257	Pawling	0	78	78	0	78	78	10	175	185	53	425	479	53	425	479	54	428	482
3256	Patterson	1	45	46	1	45	46	8	10	18	12	25	37	12	25	37	12	25	36
3255	Brewster North	27	568	595	27	568	595	2	598	600	4	913	916	4	913	916	4	914	918
3254	Brewster	1	774	775	1	774	775	69	354	423	105	538	643	105	538	643	105	538	643
3253	Croton Falls	9	322	331	9	322	331	3	715	718	10	1,027	1,037	10	1,027	1,037	10	1,028	1,038
3252	Purdy's	1	280	281	1	280	281	47	295	342	66	428	494	66	428	494	66	429	495
3251	Golden's Bridge	4	754	758	4	754	758	1	984	985	1	1,282	1,283	1	1,282	1,283	1	1,283	1,284
3250	Katonah	11	791	802	11	791	802	8	457	465	10	540	549	10	540	549	10	540	550
3249	Bedford Hills	10	496	506	10	496	506	112	528	640	147	625	771	147	625	771	148	625	772
3248	Mount Kisco	33	900	933	33	900	933	183	833	1,016	225	987	1,211	225	987	1,211	225	987	1,212
3247	Chappaqua	13	1,645	1,658	13	1,645	1,658	9	1,334	1,344	11	2,196	2,208	11	2,196	2,208	11	2,197	2,208
3246	Pleasantville	18	522	540	18	522	540	88	680	767	94	879	973	94	879	973	94	879	974
3245	Hawthorne	11	404	415	11	404	415	116	257	372	120	327	447	120	327	447	120	326	447
3244	Valhalla	5	185	190	5	185	190	63	208	271	73	262	335	73	262	335	73	262	335
3243	North White Plains	15	1,429	1,444	15	1,429	1,444	51	1,215	1,267	50	1,563	1,613	50	1,563	1,613	50	1,564	1,615
3242	White Plains	162	2,552	2,714	162	2,552	2,714	1,080	2,842	3,923	1,383	3,835	5,218	1,383	3,835	5,218	1,393	3,836	5,229
3241	Hartsdale	9	2,246	2,255	9	2,246	2,255	31	2,684	2,715	55	2,046	2,101	55	2,045	2,101	55	2,047	2,102
3240	Scarsdale	22	3,019	3,041	22	3,019	3,041	144	2,537	2,681	181	5,292	5,473	181	5,292	5,473	182	5,293	5,475
3239	Crestwood	3	1,363	1,366	3	1,363	1,366	85	2,059	2,145	116	2,744	2,859	118	2,744	2,862	119	2,744	2,862
3238	Tuckahoe	7	1,007	1,014	7	1,007	1,014	15	1,473	1,488	30	2,147	2,177	28	2,147	2,175	28	2,148	2,176
3237	Bronxville	17	2,011	2,028	17	2,011	2,028	97	1,883	1,980	129	2,655	2,783	129	2,655	2,783	129	2,655	2,784
3236	Fleetwood	5	1,880	1,885	5	1,880	1,885	45	1,587	1,631	62	2,433	2,494	62	2,433	2,494	62	2,433	2,495
3235	Mount Vernon West	115	833	948	115	833	948	167	1,006	1,173	194	401	596	194	401	596	195	401	596
3234	Wakefield	1	218	219	1	218	219	42	395	437	71	570	641	71	570	641	71	572	643
3233	Woodlawn	15	633	648	15	633	648	57	1,342	1,399	96	1,534	1,630	96	1,534	1,630	98	1,535	1,633
3232	Williams Bridge	26	92	118	26	92	118	147	593	740	270	978	1,248	270	978	1,248	280	983	1,263
3231	Botanical Garden	118	241	359	118	241	359	73	184	257	112	499	612	112	500	612	117	502	619
3230	Fordham	147	122	269	147	122	269	512	310	822	703	699	1,402	704	699	1,403	713	703	1,416
3229	Tremont	5	1	6	5	1	6	41	139	181	254	275	530	254	274	529	266	281	547
3228	Melrose	5	4	9	5	4	9	317	206	524	779	437	1,216	779	437	1,217	790	446	1,236
	Total	817	25,483	26,300	817	25,483	26,300	3,629	28,071	31,700	5,419	39,023	44,442	5,421	39,022	44,443	5,484	39,063	44,547

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
NEW HAVEN LINE																			
3297	Danbury	0	95	95	0	95	95	184	53	237	224	51	275	224	51	275	224	51	275
3296	Bethel	0	112	112	0	112	112	61	415	477	62	491	552	62	491	552	62	491	553
3295	Redding	1	60	61	1	60	61	2	238	240	2	310	312	2	310	312	2	311	313
3294	Branchville	5	175	180	5	175	180	11	99	110	11	121	133	11	121	133	11	121	132
3293	Cannondale	0	105	105	0	105	105	21	433	454	26	540	566	26	540	566	26	540	566
3291	Wilton (Kent Rd)	23	220	243	23	220	243	17	6	23	0	0	0	0	0	0	0	0	0
3290	Merritt 7	12	108	120	12	108	120	125	134	259	155	170	325	155	170	325	155	170	325
3289	New Canaan	0	984	984	0	984	984	44	944	988	75	899	975	75	894	969	75	900	975
3288	Talmadge Hill	1	334	335	1	334	335	7	782	789	13	1,492	1,505	13	1,497	1,510	13	1,492	1,505
3287	Springdale	0	318	318	0	318	318	59	194	253	99	295	393	99	287	385	99	295	393
3286	Glenbrook	1	348	349	1	348	349	114	543	657	189	816	1,005	189	825	1,013	189	817	1,005
3285	NewHaven	0	990	990	0	990	990	31	1,439	1,470	50	2,021	2,072	50	2,021	2,072	50	2,024	2,074
3284	Milford	17	618	635	17	618	635	5	17	23	6	20	26	6	20	26	6	20	26
3283	Stratford	11	546	557	11	546	557	232	522	755	263	748	1,011	263	748	1,011	263	748	1,012
3282	Bridgeport	121	388	509	121	388	509	530	607	1,137	614	1,235	1,848	614	1,235	1,848	614	1,236	1,850
3281	Fairfield	87	1,989	2,076	87	1,989	2,076	68	1,776	1,844	89	3,044	3,133	89	3,044	3,133	89	3,045	3,134
3280	Southport	9	151	160	9	151	160	88	310	398	107	3	110	107	3	110	107	3	110
3279	Green's Farms	13	551	564	13	551	564	10	602	612	13	799	812	13	799	812	13	799	812
3278	Westport	90	1,822	1,912	90	1,822	1,912	141	1,771	1,912	206	2,440	2,647	206	2,440	2,647	206	2,441	2,647
3277	East Norwalk	47	486	533	47	486	533	135	598	733	223	856	1,080	223	856	1,080	223	857	1,080
3276	South Norwalk	182	763	945	182	763	945	184	742	925	277	1,095	1,372	277	1,095	1,372	277	1,095	1,372
3275	Rowayton	5	525	530	5	525	530	29	65	94	34	96	129	34	96	129	34	96	129
3274	Darien	27	1,169	1,196	27	1,169	1,196	35	1,643	1,677	49	2,464	2,512	49	2,464	2,512	49	2,464	2,513
3273	Noroton Heights	2	965	967	2	965	967	148	940	1,088	180	1,428	1,608	180	1,428	1,608	180	1,428	1,608
3272	Stamford	976	2,572	3,548	976	2,572	3,548	2,212	2,658	4,869	3,880	3,621	7,502	3,881	3,621	7,502	3,881	3,622	7,503
3271	Old Greenwich	12	830	842	12	830	842	219	629	848	314	915	1,228	314	915	1,228	314	915	1,228
3270	Riverside	5	528	533	5	528	533	38	492	530	54	682	736	54	682	736	54	682	736
3269	Cos Cob	29	707	736	29	707	736	18	1,257	1,275	25	1,664	1,689	25	1,664	1,689	25	1,664	1,689
3268	Greenwich	214	1,838	2,052	214	1,838	2,052	403	896	1,299	697	1,169	1,865	697	1,169	1,865	697	1,169	1,866
3267	Port Chester	54	1,065	1,119	54	1,065	1,119	129	1,908	2,037	260	2,435	2,696	260	2,435	2,696	265	2,435	2,700
3266	Rye	26	1,643	1,669	26	1,643	1,669	132	1,713	1,845	167	2,121	2,288	167	2,121	2,288	167	2,121	2,288
3265	Harrison	30	1,409	1,439	30	1,409	1,439	55	1,587	1,642	81	1,918	1,999	81	1,918	1,999	82	1,918	1,999
3264	Mamaroneck	36	1,329	1,365	36	1,329	1,365	86	969	1,055	123	1,085	1,208	123	1,085	1,208	124	1,085	1,208
3263	Larchmont	28	2,641	2,669	28	2,641	2,669	81	2,291	2,372	105	2,661	2,766	105	2,661	2,766	105	2,661	2,766
3262	New Rochelle	86	1,653	1,739	86	1,653	1,739	171	1,968	2,139	226	2,129	2,355	226	2,129	2,355	226	2,129	2,355
3261	Pelham	14	1,769	1,783	14	1,769	1,783	65	1,761	1,826	77	1,994	2,070	77	1,994	2,070	77	1,994	2,071
3260	Mount Vernon	80	901	981	80	901	981	101	1,418	1,519	117	1,501	1,618	117	1,501	1,618	117	1,502	1,619
3505	Fordham	232	2	234	232	2	234	209	249	458	421	313	734	421	312	733	429	313	742
	Total	2,476	32,709	35,185	2,476	32,709	35,185	6,199	34,668	40,867	9,512	45,641	55,153	9,512	45,640	55,152	9,528	45,651	55,179

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
MANHATTAN																			
3500	125th St	864	0	864	864	0	864	2,454	774	3,228	2,850	824	3,674	2,846	822	3,669	2,846	822	3,667
3201	125th St			0			0	250	151	401	205	158	364	205	158	363	205	158	363
3200	NYC-Grand Central	66,455	0	66,455	66,455	0	66,455	68,014	2,340	70,354	86,989	3,145	90,134	86,989	3,151	90,140	86,879	3,083	89,962
	Total	67,319	0	67,319	67,319	0	67,319	70,717	3,266	73,983	90,045	4,127	94,172	90,041	4,131	94,172	89,930	4,062	93,993
Total MNCRR W/O Manhattan		4,135	73,682	77,817	4,135	73,682	77,817	13,012	80,598	93,610	17,906	103,411	121,318	17,908	103,406	121,314	18,020	103,474	121,494
Total MNCRR With Manhattan		71,454	73,682	145,136	71,454	73,682	145,136	83,729	83,864	167,592	107,951	107,538	215,489	107,950	107,537	215,486	107,950	107,537	215,487

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
CITY TERMINAL ZONE																						
3000	New York-Penn Station	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3807	New York-GCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3002	Hunterspoint Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3001	Long Island City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3091	Flatbush Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3806	Jamaica Penn Station	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3003	Woodside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3808	Sunnyside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3004	Forest Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3005	Kew Gardens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3092	Nostrand Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3093	East New York	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BABYLON BRANCH																						
3049	Babylon	2,167	3,234	1,517	2,788	4,021	1,951	3,070	4,566	2,149	2,354	3,569	1,647	3,045	4,404	2,131	3,400	5,067	2,380	2,592	3,956	1,814
3048	Lindenhurst	1,037	1,298	726	1,615	1,950	1,130	1,440	1,775	1,008	2,329	3,407	1,630	1,837	2,235	1,286	1,597	1,963	1,118	2,606	3,814	1,824
3047	Copiague	1,065	1,393	745	1,503	1,965	1,052	1,508	1,969	1,055	1,627	2,120	1,139	1,666	2,179	1,168	1,671	2,184	1,170	1,815	2,359	1,271
3046	Amityville	1,001	1,059	701	1,380	1,470	966	1,385	1,475	969	1,497	1,593	1,048	1,518	1,616	1,063	1,524	1,621	1,067	1,649	1,750	1,154
3045	Massapequa Park	1,477	2,013	1,034	1,757	2,391	1,230	1,761	2,397	1,233	1,998	2,601	1,398	1,846	2,510	1,292	1,850	2,516	1,295	2,100	2,731	1,470
3044	Massapequa	1,986	2,868	1,390	2,365	3,401	1,656	2,374	3,410	1,662	2,308	3,366	1,616	2,479	3,562	1,735	2,487	3,570	1,741	2,441	3,539	1,708
3043	Seaford	1,726	2,334	1,208	1,995	2,674	1,396	2,000	2,679	1,400	1,949	2,468	1,364	2,079	2,787	1,455	2,085	2,793	1,460	2,023	2,562	1,416
3042	Wantagh	2,023	3,328	1,416	2,342	3,782	1,639	2,332	3,742	1,632	2,244	3,288	1,570	2,455	3,963	1,719	2,445	3,923	1,712	2,356	3,452	1,650
3041	Bellmore	2,121	3,106	1,484	2,534	3,695	1,773	2,538	3,701	1,777	2,666	3,903	1,866	2,656	3,863	1,859	2,660	3,868	1,862	2,801	4,087	1,961
3040	Merrick	2,329	3,361	1,631	2,748	3,962	1,924	2,751	3,966	1,926	2,956	4,910	2,069	2,873	4,139	2,011	2,878	4,144	2,015	3,116	5,153	2,181
3039	Freeport	1,827	3,236	1,279	2,140	3,757	1,498	2,147	3,767	1,503	2,253	3,627	1,577	2,244	3,929	1,571	2,248	3,936	1,574	2,363	3,791	1,654
3038	Baldwin	2,561	3,351	1,793	2,994	3,867	2,096	3,000	3,875	2,100	3,511	4,544	2,458	3,142	4,069	2,200	3,149	4,078	2,204	3,678	4,766	2,574
3037	Rockville Centre	1,688	1,671	1,181	1,770	1,755	1,239	1,774	1,757	1,242	1,862	1,782	1,303	1,850	1,835	1,295	1,851	1,836	1,296	1,963	1,873	1,374
	Total	23,009	32,252	16,106	27,929	38,691	19,550	28,080	39,079	19,656	29,553	41,176	20,687	29,691	41,093	20,784	29,847	41,499	20,893	31,502	43,832	22,051

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

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Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
FAR ROCKAWAY BRANCH																						
3127	Far Rockaway	32	2	17	200	138	106	201	138	107	202	139	107	212	146	112	213	146	113	212	146	113
3126	Inwood	332	614	176	335	595	178	336	596	178	349	622	185	352	626	187	353	627	187	366	653	194
3125	Lawrence	403	513	214	423	540	224	424	541	225	452	577	240	440	560	233	440	561	233	469	598	249
3124	Cedarhurst	302	88	160	327	95	173	326	95	173	334	97	177	342	99	181	342	99	181	351	102	186
3123	Woodmere	478	309	253	537	346	284	536	346	284	540	347	286	558	359	296	558	359	296	562	359	298
3122	Hewlett	874	690	463	977	771	518	978	772	519	986	778	522	1,018	803	539	1,019	804	540	1,026	810	544
3121	Gibson	61	35	32	68	39	36	68	39	36	68	39	36	72	41	38	72	41	38	72	41	38
3097	Valley Stream	1,988	2,086	1,054	2,191	2,266	1,161	2,198	2,274	1,165	2,309	2,402	1,224	2,293	2,385	1,215	2,299	2,392	1,218	2,425	2,534	1,285
3096	Rosedale	621	535	329	807	834	428	814	839	431	916	960	485	856	883	453	862	887	457	971	1,015	514
3095	Laurelton	506	248	268	522	299	277	523	299	277	590	339	313	556	320	295	556	320	295	628	363	333
3094	Locust Manor	386	204	205	259	133	137	259	133	138	252	115	133	270	139	143	271	139	144	262	120	139
	Total	5,983	5,325	3,171	6,646	6,056	3,522	6,664	6,073	3,532	6,999	6,415	3,709	6,969	6,362	3,693	6,985	6,376	3,702	7,344	6,740	3,892
HEMPSTEAD BRANCH																						
3120	Hempstead	791	1,508	435	842	1,618	463	854	1,627	470	952	1,812	524	901	1,709	495	901	1,710	496	1,010	1,906	555
3119	Country Life Press	289	594	159	309	655	170	310	657	171	345	718	190	327	689	180	328	690	180	365	755	201
3118	Garden City	242	51	133	284	60	156	304	64	167	304	64	167	323	69	178	323	69	178	342	72	188
3117	Nassau Blvd	283	207	156	315	230	173	320	233	176	509	370	280	342	249	188	342	249	188	545	396	300
3116	Stewart Manor	449	602	247	470	633	258	483	639	266	714	796	393	514	680	283	515	680	283	752	843	414
3115	Floral Park	1,054	1,303	580	1,000	1,243	550	1,020	1,253	561	559	832	308	1,080	1,326	594	1,082	1,327	595	652	937	359
3114	Bellerose	356	354	196	273	250	150	312	279	171	348	278	191	330	297	182	330	297	182	389	311	214
3008	Queens Village	441	445	243	474	502	261	489	517	269	735	831	404	512	542	282	520	550	286	788	889	434
3007	Hollis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	3,905	5,064	2,148	3,966	5,192	2,182	4,092	5,269	2,250	4,466	5,700	2,456	4,329	5,560	2,381	4,341	5,572	2,388	4,843	6,110	2,664

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

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		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
LONG BEACH BRANCH																						
3113	Long Beach	1,495	1,153	763	1,866	1,392	952	1,690	1,284	862	1,754	1,334	895	2,026	1,539	1,033	1,768	1,342	902	1,835	1,394	936
3112	Island Park	1,461	1,169	745	1,506	1,218	768	1,712	1,369	873	1,760	1,407	898	1,501	1,195	766	1,803	1,442	919	1,854	1,483	945
3111	Oceanside	758	804	386	655	810	334	1,187	1,098	605	1,097	1,086	559	656	843	335	1,269	1,182	647	1,188	1,171	606
3110	East Rockaway	752	780	383	1,132	1,188	577	663	692	338	781	814	398	1,221	1,274	623	681	698	347	794	825	405
3109	Centre Ave	213	65	109	256	78	131	257	78	131	265	83	135	271	82	138	272	83	139	281	88	143
3036	Lynbrook	1,264	877	645	1,280	888	653	1,285	890	655	1,366	952	697	1,339	928	683	1,341	929	684	1,438	999	733
	Total	5,943	4,848	3,031	6,694	5,574	3,414	6,794	5,410	3,465	7,024	5,676	3,582	7,014	5,861	3,577	7,134	5,676	3,638	7,390	5,959	3,769
MONTAUK BRANCH																						
3068	Montauk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3067	Amagansett	94	1,047	81	131	1,428	112	131	1,437	113	131	1,431	112	153	1,670	132	154	1,679	133	153	1,672	132
3066	East Hampton	21	65	18	28	86	24	29	87	25	28	86	24	32	98	28	32	99	28	32	98	28
3065	Bridgehampton	14	18	12	20	27	17	20	27	17	21	28	18	23	30	20	23	30	20	23	31	20
3064	Southampton	37	86	32	48	114	42	48	114	42	48	115	42	54	127	46	54	127	46	54	128	47
3063	Southampton Campus-L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3062	Hampton Bays	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3061	Quogue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3060	Westhampton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3059	Speonk	19	81	17	42	166	36	41	162	35	43	171	37	47	185	40	45	180	39	48	190	41
3058	Center Moriches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3057	Mastic-Shirley	173	311	148	298	545	257	303	554	261	307	563	264	341	626	294	347	635	298	351	646	302
3056	Bellport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3055	Patchogue	389	663	318	579	1,036	498	593	1,061	510	591	1,052	508	644	1,151	554	660	1,179	567	657	1,168	565
3054	Sayville	484	742	416	859	1,327	738	817	1,286	703	900	1,406	774	951	1,471	818	908	1,429	781	999	1,561	860
3053	Oakdale	192	320	165	278	495	239	209	351	180	203	356	175	293	508	252	236	393	203	228	399	196
3052	Great River	81	140	70	92	167	79	264	440	227	143	238	123	121	220	104	291	486	250	158	263	136
3051	Islip	310	383	266	491	605	422	540	664	464	493	608	424	546	673	469	601	739	516	548	676	472
3050	Bay Shore	544	746	468	848	1,168	730	932	1,307	802	864	1,203	743	941	1,322	809	1,035	1,456	890	959	1,339	825
	Total	2,338	4,603	2,011	3,715	7,185	3,195	3,928	7,490	3,378	3,773	7,257	3,245	4,147	8,079	3,566	4,385	8,432	3,772	4,212	8,173	3,622

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		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
OYSTER BAY																						
3108	Oyster Bay	22	19	12	22	17	12	25	20	14	22	17	13	24	18	13	27	22	15	24	18	13
3107	Mill Neck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3106	Locust Valley	187	211	105	247	281	138	269	306	151	255	292	143	259	294	145	282	320	158	268	306	150
3105	Glen Cove	88	28	49	113	32	63	121	35	68	115	33	65	119	34	67	128	37	72	122	35	68
3104	Glen St	200	288	112	273	363	153	304	404	170	280	375	157	287	381	161	319	425	179	294	394	165
3103	Sea Cliff	192	145	107	239	186	134	279	211	156	247	192	138	250	195	140	292	221	164	259	202	145
3102	Glen Head	241	309	135	333	433	186	397	555	222	339	438	190	361	472	202	430	604	241	368	477	206
3101	Greenvale	173	229	97	245	329	137	268	359	150	249	334	140	267	362	150	293	394	164	272	368	153
3100	Roslyn	240	260	134	297	328	166	343	379	192	316	349	177	310	342	173	358	395	200	330	364	185
3099	Albertson	203	227	114	238	288	133	292	364	164	250	299	140	249	301	139	305	380	171	261	313	146
3098	East Williston	378	363	212	515	512	289	586	596	328	446	429	250	539	535	302	613	622	343	467	449	262
	Total	1,925	2,060	1,078	2,521	2,769	1,412	2,885	3,228	1,616	2,520	2,759	1,411	2,665	2,934	1,492	3,048	3,419	1,707	2,665	2,924	1,493
PORT JEFFERSON																						
3078	Port Jefferson	338	1,413	223	628	2,428	415	679	2,611	448	651	2,491	429	716	2,747	473	759	2,914	501	714	2,745	472
3077	Stony Brook	559	2,499	369	516	1,860	340	553	1,766	365	494	1,513	326	563	1,750	372	622	1,982	410	570	1,790	376
3076	St James	203	425	134	234	454	155	257	502	169	236	460	156	262	509	173	287	563	189	264	515	175
3075	Smithtown	552	1,038	364	746	1,410	492	788	1,490	520	749	1,415	494	827	1,567	546	874	1,656	577	830	1,572	548
3074	Kings Park	854	1,697	563	1,162	2,309	767	1,247	2,486	823	1,166	2,315	770	1,291	2,564	852	1,386	2,765	915	1,294	2,570	854
3073	Northport	1,090	2,977	719	1,190	3,691	786	1,278	3,871	844	1,184	3,701	782	1,314	4,060	867	1,427	4,277	942	1,304	4,067	860
3072	Greenlawn	539	983	356	66	90	44	111	153	73	62	79	41	76	104	50	125	173	82	69	88	46
3071	Huntington	3,723	12,043	2,457	6,771	23,147	4,469	7,297	24,941	4,816	6,410	21,098	4,231	7,485	25,601	4,940	8,048	27,502	5,312	7,093	23,355	4,681
3070	Cold Spring Harbor	753	1,370	497	855	1,381	564	677	1,087	447	1,132	1,956	747	936	1,512	618	744	1,195	491	1,243	2,146	820
3069	Syosset	2,518	5,147	1,662	3,066	6,346	2,024	3,060	6,301	2,020	3,401	6,982	2,245	3,232	6,702	2,133	3,221	6,652	2,126	3,601	7,386	2,376
3014	Hicksville	5,761	10,540	3,803	7,437	13,832	4,908	7,474	13,886	4,933	7,020	12,888	4,633	7,799	14,512	5,147	7,838	14,571	5,173	7,346	13,501	4,849
3013	Westbury	1,493	2,094	985	1,387	1,665	915	1,393	1,666	920	2,068	2,774	1,365	1,461	1,754	964	1,459	1,741	963	2,221	3,018	1,466
3012	Carle Place	440	435	290	461	456	318	505	484	333	317	343	210	524	500	346	529	505	349	358	387	236
3011	Mineola	1,603	1,520	1,058	1,984	1,889	1,309	2,018	1,919	1,332	1,892	1,771	1,249	2,082	1,961	1,374	2,116	2,011	1,396	1,994	1,860	1,316
3010	Merillon Ave	1,444	1,051	953	1,696	1,199	1,119	1,695	1,188	1,119	2,033	1,507	1,342	1,810	1,278	1,195	1,804	1,264	1,191	2,184	1,615	1,441
3009	New Hyde Park	1,508	1,026	995	1,902	1,253	1,255	1,907	1,254	1,258	2,478	1,889	1,636	2,035	1,340	1,343	2,038	1,341	1,345	2,713	2,043	1,790
	Total	23,378	46,258	15,430	30,122	63,211	19,880	30,940	65,605	20,420	31,293	63,181	20,653	32,413	68,482	21,392	33,278	71,112	21,964	33,797	68,658	22,306

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		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
PORT WASHINGTON																						
3090	Port Washington	1,812	1,875	380	2,127	2,209	447	2,155	2,225	452	2,173	2,252	456	2,255	2,330	474	2,256	2,330	474	2,311	2,380	485
3089	Plandome	148	244	31	172	285	36	177	289	37	176	291	37	185	302	39	185	302	39	192	310	40
3088	Manhasset	2,047	2,918	430	2,759	4,051	579	2,421	3,424	508	2,236	3,367	470	2,948	4,276	619	2,529	3,574	531	2,485	3,611	522
3087	Great Neck	2,351	2,448	494	2,417	2,185	508	2,887	2,976	606	3,314	3,577	696	2,661	2,344	559	3,030	3,127	636	3,567	3,727	749
3086	Little Neck	1,129	2,490	237	781	2,198	164	864	2,273	181	910	2,570	191	918	2,446	193	902	2,383	189	1,075	2,857	226
3085	Douglaston	1,019	830	214	1,216	969	255	1,226	975	257	1,337	1,068	281	1,288	1,030	270	1,276	1,015	268	1,415	1,135	297
3084	Bayside	2,536	2,849	533	1,464	1,293	308	1,509	1,347	317	1,711	1,676	359	1,589	1,422	334	1,577	1,408	331	1,858	1,824	390
3083	Auburndale	1,308	1,350	275	1,178	2,017	247	1,209	2,058	254	2,353	3,790	494	1,297	2,213	272	1,281	2,170	269	2,523	4,065	530
3082	Broadway	840	525	177	575	422	121	600	433	126	988	748	207	639	464	134	621	440	130	1,072	803	225
3081	Murray Hill	161	44	34	110	34	23	118	37	25	157	47	33	127	40	27	126	39	26	186	56	39
3080	Flushing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	13,351	15,575	2,804	12,798	15,662	2,688	13,165	16,036	2,765	15,354	19,386	3,224	13,908	16,887	2,921	13,782	16,789	2,894	16,683	20,769	3,504
RONKONKOMA																						
3029	Greenport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3028	Southold	40	114	35	54	149	46	54	150	46	55	151	47	60	166	52	60	167	52	61	169	53
3027	Mattituck	46	57	40	39	61	34	40	61	34	39	61	34	46	70	40	46	70	40	46	70	40
3026	Riverhead	51	181	44	100	454	86	100	458	86	100	455	86	113	518	97	114	522	98	113	519	98
3025	Yaphank	10	19	9	14	26	12	14	26	12	14	26	12	16	31	14	16	31	14	16	31	14
3024	Medford	10	12	9	14	18	12	14	18	12	14	18	12	17	20	14	17	20	14	17	21	14
3023	Holtsville	79	405	68	120	634	103	125	661	107	123	657	106	133	700	115	139	732	120	138	728	119
3022	Ronkonkoma	4,545	23,348	3,909	6,211	32,815	5,341	6,244	32,844	5,370	6,109	33,085	5,254	6,934	36,528	5,963	6,967	36,759	5,992	6,822	37,067	5,867
3021	Central Islip	991	1,694	853	1,157	2,041	995	1,163	2,055	1,001	1,654	3,254	1,422	1,335	2,343	1,148	1,342	2,359	1,154	1,855	3,649	1,595
3020	Brentwood	1,119	1,908	963	2,180	4,025	1,875	2,156	3,974	1,854	1,403	2,602	1,207	2,382	4,379	2,049	2,346	4,316	2,018	1,548	2,891	1,331
3019	Deer Park	1,533	3,030	1,318	1,310	2,264	1,127	1,266	2,134	1,089	3,414	7,411	2,936	1,474	2,555	1,268	1,437	2,438	1,236	3,804	8,247	3,272
3018	Wyandanch	1,202	1,854	1,033	1,666	2,647	1,451	1,674	2,597	1,440	1,432	2,201	1,231	1,884	2,954	1,620	1,868	2,899	1,607	1,611	2,475	1,385
3017	Pine Lawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3016	Farmingdale	1,129	2,284	971	1,361	2,770	1,170	1,367	2,790	1,175	1,441	2,942	1,239	1,462	2,971	1,258	1,466	2,990	1,261	1,550	3,155	1,333
3015	Bethpage	948	1,365	815	1,177	1,737	1,012	1,227	1,847	1,056	1,661	2,781	1,429	1,251	1,835	1,076	1,304	1,949	1,121	1,777	2,943	1,528
	Total	11,704	36,271	10,068	15,423	49,441	13,264	15,443	49,615	13,281	17,460	55,645	15,016	17,108	55,068	14,713	17,121	55,253	14,724	19,358	61,964	16,648

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
WEST HEMPSTEAD																						
3132	West Hempstead	196	119	90	187	113	86	185	112	85	209	127	96	192	117	88	193	117	89	216	132	99
3131	Hempstead Gardens	274	67	126	274	68	126	275	68	126	306	76	141	288	71	133	288	71	133	322	80	148
3130	Lakeview	244	207	112	264	221	121	265	222	122	289	240	133	277	233	128	278	234	128	303	253	139
3129	Malverne	399	314	184	443	347	204	444	348	204	501	391	231	467	366	215	467	367	215	527	412	243
3128	Westwood	459	413	211	472	425	217	474	427	218	529	477	243	492	443	226	493	444	227	550	496	253
3035	St Albans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	1,572	1,120	723	1,639	1,174	754	1,642	1,177	755	1,835	1,312	844	1,716	1,230	790	1,720	1,233	791	1,919	1,372	883
LIRR TOTALS																						
LIRR Total W/O Terminal Zone		93,107	153,375	56,566	111,453	194,955	69,660	113,633	198,982	71,119	120,278	208,508	74,829	119,959	211,535	75,309	121,642	215,361	76,473	129,714	226,502	80,832
LIRR Total With Terminal Zone		93,107	153,375	56,566	111,453	194,955	69,660	113,633	198,982	71,119	120,278	208,508	74,829	119,959	211,535	75,309	121,642	215,361	76,473	129,714	226,502	80,832

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
METRO NORTH																						
HUDSON LINE																						
3227	Poughkeepsie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3226	New Hamburg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3225	Beacon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3224	Cold Spring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3223	Garrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3222	Peekskill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3221	Montrose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3220	Crugers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3219	Croton-Harmon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3218	Ossining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3217	Scarborough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3216	Philipse Manor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3215	Tarrytown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3214	Irvington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3213	Ardsley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	Dobbs Ferry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3211	Hastings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	Greystone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3209	Glenwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3208	Yonkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3207	Ludlow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3206	Riverdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3205	Spuyten Duyvil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3204	Marble Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3203	University Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3202	Morris Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
HARLEM LINE																						
3259	Dover Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3258	Harlem Valley-Wingda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3257	Pawling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3256	Patterson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3255	Brewster North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3254	Brewster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3253	Croton Falls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3252	Purdy's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3251	Golden's Bridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3250	Katonah	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3249	Bedford Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248	Mount Kisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3247	Chappaqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3246	Pleasantville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3245	Hawthorne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3244	Valhalla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3243	North White Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3242	White Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3241	Hartsdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3240	Scarsdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3239	Crestwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3238	Tuckahoe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3237	Bronxville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3236	Fleetwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3235	Mount Vernon West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3234	Wakefield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3233	Woodlawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3232	Williams Bridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3231	Botanical Garden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3230	Fordham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3229	Tremont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3228	Melrose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

		1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
Node	Station	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
NEW HAVEN LINE																						
3297	Danbury	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3296	Bethel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3295	Redding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3294	Branchville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3293	Cannondale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3291	Wilton (Kent Rd)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3290	Merritt 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3289	New Canaan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3288	Talmadge Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3287	Springdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3286	Glenbrook	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	NewHaven	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3284	Milford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3283	Stratford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3282	Bridgeport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3281	Fairfield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3280	Southport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3279	Green's Farms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3278	Westport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3277	East Norwalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3276	South Norwalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3275	Rowayton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3274	Darien	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3273	Noroton Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3272	Stamford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3271	Old Greenwich	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3270	Riverside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3269	Cos Cob	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3268	Greenwich	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3267	Port Chester	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3266	Rye	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3265	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3264	Mamaroneck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3263	Larchmont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3262	New Rochelle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3261	Pelham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3260	Mount Vernon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3505	Fordham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
MANHATTAN																						
3500	125th St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3201	125th St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3200	NYC-Grand Central	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total MNCRR W/O Manhattan		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total MNCRR With Manhattan		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A-13
Weekday AM Peak 1-Hour Subway Passengers On-Board East Side Subways by Location

					BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
MNR:	0.355	1995 Capacity	1995 Count 1 Hour	1995 Actual V/C	(NB95) 1995 BASE NETWORK Est. 1 Hr.	(NB13) 2010 NO-BUILD Est. 1 Hr.	(T310) 2010 TSM Est. 1 Hr.	(G310) 2010 LIRR-GCT BUILD Est. 1 Hr.	(NB23) 2020 NO-BUILD Est. 1 Hr.	(TSM3) 2020 TSM Est. 1 Hr.	(GCT3) 2020 LIRR-GCT BUILD Est. 1 Hr.
LIRR:	0.355										
Lexington Avenue											
4/5	149th St/138th Street	31,900	18,455	0.58	22,033	22,203	22,349	22,233	23,631	23,692	23,553
	125th Street	31,900	24,270	0.76	27,453	28,914	28,968	28,928	30,705	30,775	30,748
	86th Street	29,700	32,060	1.08	29,775	32,200	32,302	32,203	33,765	33,853	33,667
	59th Street	28,600	24,980	0.87	28,592	27,783	27,937	27,898	28,950	29,054	28,973
	Grand Central	25,300	29,390	1.16	29,137	29,657	29,673	31,137	30,603	30,745	32,497
	14th Street	25,300	23,380	0.92	25,619	25,224	25,238	26,456	25,931	26,037	27,498
	Brooklyn Bridge	25,300	20,860	0.82	22,880	23,466	23,487	24,386	24,103	24,252	25,279
	Total		173,395		185,488	189,447	189,953	193,241	197,688	198,409	202,215
6	3rd Avenue	26,400	14,245	0.54	14,966	17,049	17,060	17,046	18,328	18,371	18,361
	125th Street	26,400	9,940	0.38	5,469	6,585	6,673	6,588	7,192	7,232	7,136
	86th Street	26,400	17,720	0.67	12,808	13,613	13,658	13,656	14,295	14,348	14,477
	68th Street	26,400	19,890	0.75	17,789	17,901	17,952	17,969	18,564	18,611	18,725
	59th Street	26,400	17,960	0.68	19,764	19,453	19,560	19,454	20,129	20,214	20,225
	Grand Central	26,400	15,050	0.57	15,983	16,253	16,282	16,615	16,811	16,831	17,025
	14th Street	26,400	7,550	0.29	7,023	6,513	6,581	6,804	6,786	6,851	7,031
	Total		102,355		93,802	97,367	97,766	98,131	102,105	102,457	102,980
Total			275,750		279,290	286,814	287,720	291,372	299,794	300,866	305,196
East Side Totals											
Lexington Ave											
4/5/6	125th Street		34,210		32,922	35,498	35,641	35,516	37,897	38,007	37,884
4/5/6	86th Street		49,780		42,583	45,813	45,960	45,858	48,060	48,201	48,144
4/5/6	59th Street		42,940		48,356	47,235	47,496	47,352	49,079	49,269	49,198
4/5/6	Grand Central		44,440		45,120	45,911	45,954	47,752	47,414	47,576	49,522
4/5/6	14th Street		30,930		32,641	31,736	31,820	33,259	32,717	32,887	34,529
4/5	Brooklyn Bridge		20,860		22,880	23,466	23,487	24,386	24,103	24,252	25,279
	Total		223,160		224,502	229,660	230,358	234,124	239,270	240,193	244,557

Table A-14
Weekday AM Peak 1-Hour Subway Passengers On-Board Line at Maximum Load Point

					BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
		1995 Capacity	1995 Count 1 Hour	1995 Actual V/C	(NB95) 1995 BASE NETWORK Est. 1 Hr.	(NB13) 2010 NO-BUILD Est. 1 Hr.	(T310) 2010 TSM Est. 1 Hr.	(G310) 2010 LIRR-GCT BUILD Est. 1 Hr.	(NB23) 2020 NO-BUILD Est. 1 Hr.	(TSM3) 2020 TSM Est. 1 Hr.	(GCT3) 2020 LIRR-GCT BUILD Est. 1 Hr.
North of 60th Street											
1/9	103rd Street	17,600	14,970	0.85	15,043	18,153	18,196	18,191	18,707	18,682	18,692
2/3	72nd Street	24,090	20,560	0.85	20,009	23,894	23,741	23,975	24,954	24,800	24,902
A/D	125th Street	28,180	16,420	0.58	16,746	18,521	18,498	18,524	19,591	19,627	19,581
B/C	72nd Street	15,660	9,620	0.61	10,605	12,112	12,111	12,047	12,586	12,519	12,476
Q	Roosevelt Island	12,600	1,441	0.11	1,095	16,495	16,515	16,048	17,419	17,319	16,888
4/5	86th Street	29,700	32,060	1.08	29,775	32,200	32,302	32,203	33,765	33,853	33,667
6	68th Street	26,400	19,890	0.75	17,789	17,901	17,952	17,969	18,564	18,611	18,725
Total			114,961		111,061	139,275	139,316	138,956	145,585	145,411	144,932
Queens											
N	Queensboro Plaza	15,587	13,620	0.87	14,472	17,865	17,880	17,823	18,714	18,816	18,521
R/T	Queens Plz	15,455	12,680	0.82	11,921	8,901	8,864	8,941	9,402	9,379	9,475
E/F	23rd Street	42,600	48,190	1.13	46,384	39,027	38,875	38,299	40,727	40,679	40,092
7	33rd Street	30,250	24,320	0.80	23,336	25,901	25,708	24,578	27,014	26,829	25,690
	Total		98,810		96,113	91,695	91,328	89,640	95,858	95,703	93,778
North Brooklyn											
L	Bedford Avenue	15,080	12,420	0.82	11,641	14,435	14,435	14,428	15,051	15,092	15,106
J/M/Z	Marcy Avenue	22,040	13,000	0.59	14,041	17,155	17,008	17,189	17,976	17,847	17,953
	Total		25,420		25,682	31,590	31,444	31,617	33,026	32,939	33,059
South Brooklyn											
F	Bergen Street	21,000	16,510	0.79	19,643	20,119	20,051	20,111	21,035	20,981	21,021
B/N	36th Street	22,936	18,890	0.82	18,648	20,251	20,255	20,184	21,037	21,067	21,240
D/Q	7th Avenue	30,800	20,320	0.66	22,681	26,660	26,677	26,653	27,919	27,954	27,926
A/C	High Street	34,804	26,640	0.77	28,442	27,945	28,001	27,862	29,302	29,316	29,208
2/3	Atlantic Avenue	20,900	15,470	0.74	14,313	15,528	15,537	15,473	16,377	16,321	16,268
M/R	DeKalb Avenue	20,520	9,010	0.44	6,665	6,009	5,969	5,982	6,297	6,322	6,308
4/5	Atlantic Avenue	29,700	26,680	0.90	26,477	29,687	29,936	29,356	31,025	31,228	30,492
G	Clinton-Washington	6,300	4,280	0.68	3,395	3,116	3,114	3,115	3,318	3,316	3,316
S	Botanic Gardens	2,450	0	0.00	1,031	960	960	960	1,022	1,022	1,022
	Total		137,800		141,295	150,275	150,501	149,696	157,333	157,527	156,802

Appendix B: Traffic and Transportation

LONG ISLAND RAIL ROAD
EAST SIDE ACCESS DEIS

TECHNICAL APPENDIX:
TRAFFIC AND PEDESTRIAN LEVEL OF SERVICE ANALYSES

Prepared by:

ENG-WONG, TAUB & ASSOCIATES
TWO PENN PLAZA
NEW YORK, NY 10121

December 1999

INTRODUCTION

This Technical Appendix contains the detailed traffic and pedestrian level of service analyses conducted for existing conditions and for the No Build and Preferred (East Side Access) Alternatives. The contents of this Technical Appendix is subdivided into the three geographical areas addressed in the DEIS: Midtown Manhattan; Sunnyside, Queens; and Eastern Queens and Long Island.

CONTENTS OF THE MIS/DEIS AND THE TECHNICAL APPENDIX

The DEIS contains a full verbal and graphic description of traffic and pedestrian conditions in the three study areas under existing conditions and the various alternatives. In terms of traffic level of service findings, the DEIS presents an overview of the impacts associated with the alternatives -- where significant impacts are expected and what types of improvements would be needed to mitigate adverse impacts. This Technical Appendix provides an additional layer of analysis details. For vehicular traffic, it includes volume-to-capacity (v/c) ratios, average vehicle delays, and levels of service by approach and by lane group for each intersection analyzed, as well as for the mitigated conditions. For pedestrian and passenger flow analyses, it includes v/c ratios, time-space analyses, and levels of service for conditions within Grand Central Terminal, for Lexington Avenue subway station facilities, and for on-street sidewalk and crosswalk analyses. Additional levels of detail -- e.g., intersection capacity analysis worksheets themselves -- are available within a series of books at the offices of Eng-Wong, Taub & Associates.

The contents of this Technical Appendix include the following Figures and Tables:

Grand Central Terminal (GCT) Area

Figure M-1 Existing Grand Central Terminal Area Traffic Volumes
Figure M-2 No Build Alternative GCT Area Traffic Volumes
Figure M-3 Build Alternative GCT Area Traffic Volumes
Figure M-4 Existing GCT External Pedestrian Volumes
Figure M-5 2010 No Build GCT External Pedestrian Volumes
Figure M-6 2010 Build GCT External Pedestrian Volumes
Figure M-7 GCT Upper Concourse Pedestrian Volumes
Figure M-8 Lexington Avenue Subway Stairwell Volumes

Table M-1 Existing Grand Central Area Traffic Levels of Service
Table M-2 No Build Alternative GCT Area Traffic Levels of Service
Table M-3 Build / Mitigated Alternative GCT Area Traffic Levels of Service
Table M-4 Existing GCT External Pedestrian Analyses
Table M-5 2010 No Build GCT External Pedestrian Analyses
Table M-6 2010 Build GCT External Pedestrian Analyses
Table M-7 2010 Mitigated Build GCT External Pedestrian Analyses
Table M-8 Existing GCT Internal Pedestrian Analyses
Table M-9 2010 No Build GCT Internal Pedestrian Analyses
Table M-10 2020 No Build GCT Internal Pedestrian Analyses
Table M-11 2010 Build GCT Internal Pedestrian Analyses
Table M-12 2020 Build GCT Internal Pedestrian Analyses
Table M-13 2010 Mitigated Build GCT Internal Pedestrian Analyses
Table M-14 2020 Mitigated Build GCT Internal Pedestrian Analyses
Table M-15 Subway Mezzanine B Pedestrian Analyses
Table M-16 Existing Subway Stairs Analyses

Table M-17 2010 No Build Subway Stairs Analyses
Table M-18 2020 No Build Subway Stairs Analyses
Table M-19 2010 Build Subway Stairs Analyses
Table M-20 2020 Build Subway Stairs Analyses
Table M-21 2010 Mitigated Build Subway Stairs Analyses
Table M-22 2020 Mitigated Build Subway Stairs Analyses
Table M-23 Existing Subway Platform Time-Space Analyses
Table M-24 2010 No Build Subway Platform Time-Space Analyses
Table M-25 2020 No Build Subway Platform Time-Space Analyses
Table M-26 2010 Build Subway Platform Time-Space Analyses
Table M-27 2020 Build Subway Platform Time-Space Analyses
Table M-28 2010 Mitigated Build Subway Platform Time-Space Analyses
Table M-29 2020 Mitigated Build Subway Platform Time-Space Analyses
Table M-30 LIRR Platform Analyses
Table M-31 GCT External / NEA Analyses

Sunnyside Area

Figure S-1 Existing Sunnyside Area Traffic Volumes
Figure S-2 2010 No Build Sunnyside Area Traffic Volumes
Figure S-3 Sunnyside Pedestrian Volumes

Table S-1 Existing Sunnyside Area Traffic Levels of Service
Table S-2 2010 No Build Sunnyside Area Traffic Levels of Service
Table S-3 Sunnyside Pedestrian Analyses

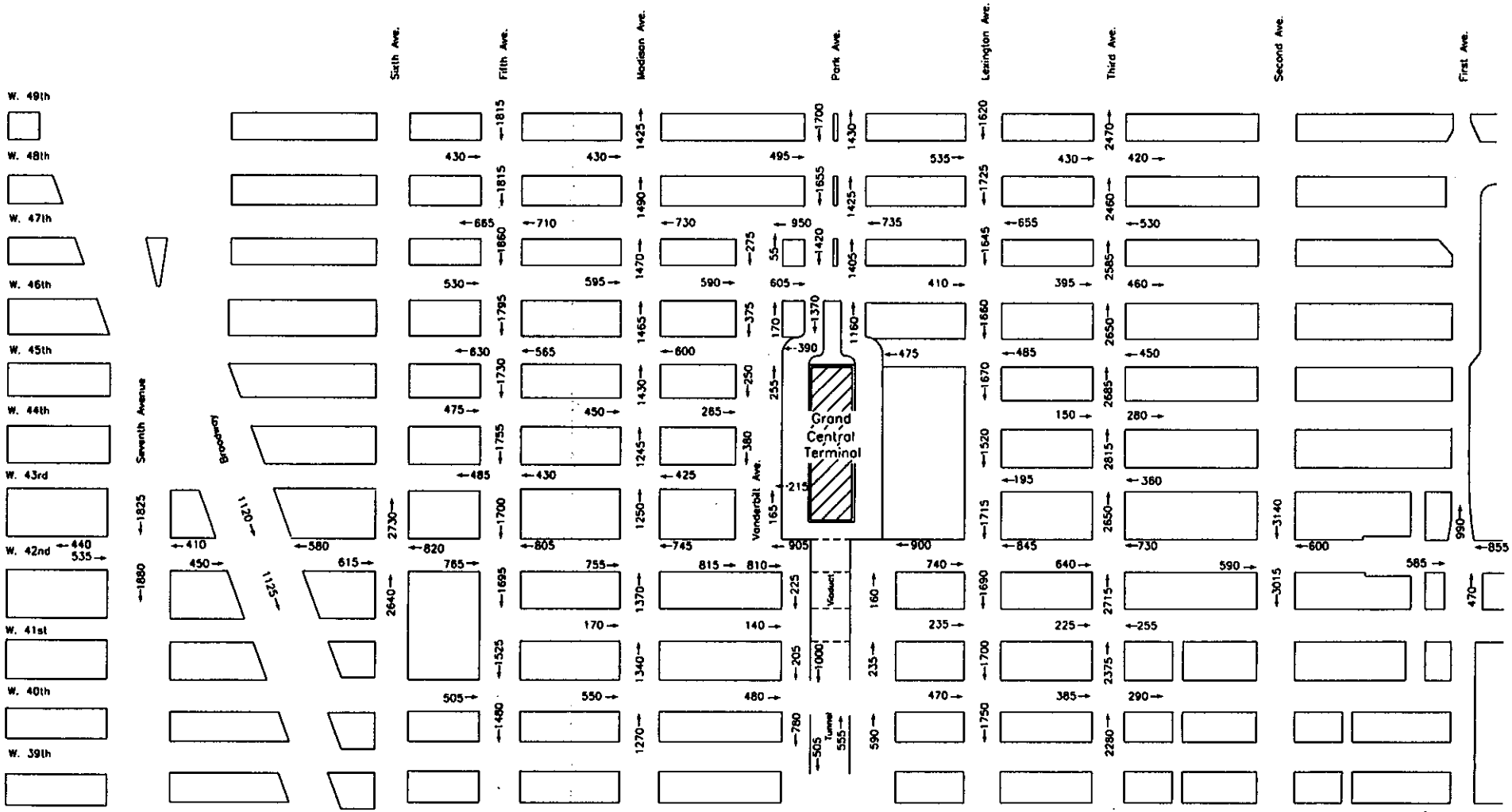
Eastern Queens and Long Island

Figures L-1 to L-15 Existing Long Island Rail Road Station Area Traffic Volumes (1 per station area)
Figures L-16 to L-30 No Build Long Island Rail Road Station Area Traffic Volumes (1 per station area)
Figures L-31 to L-45 Build Long Island Rail Road Station Area Traffic Volumes (1 per station area)

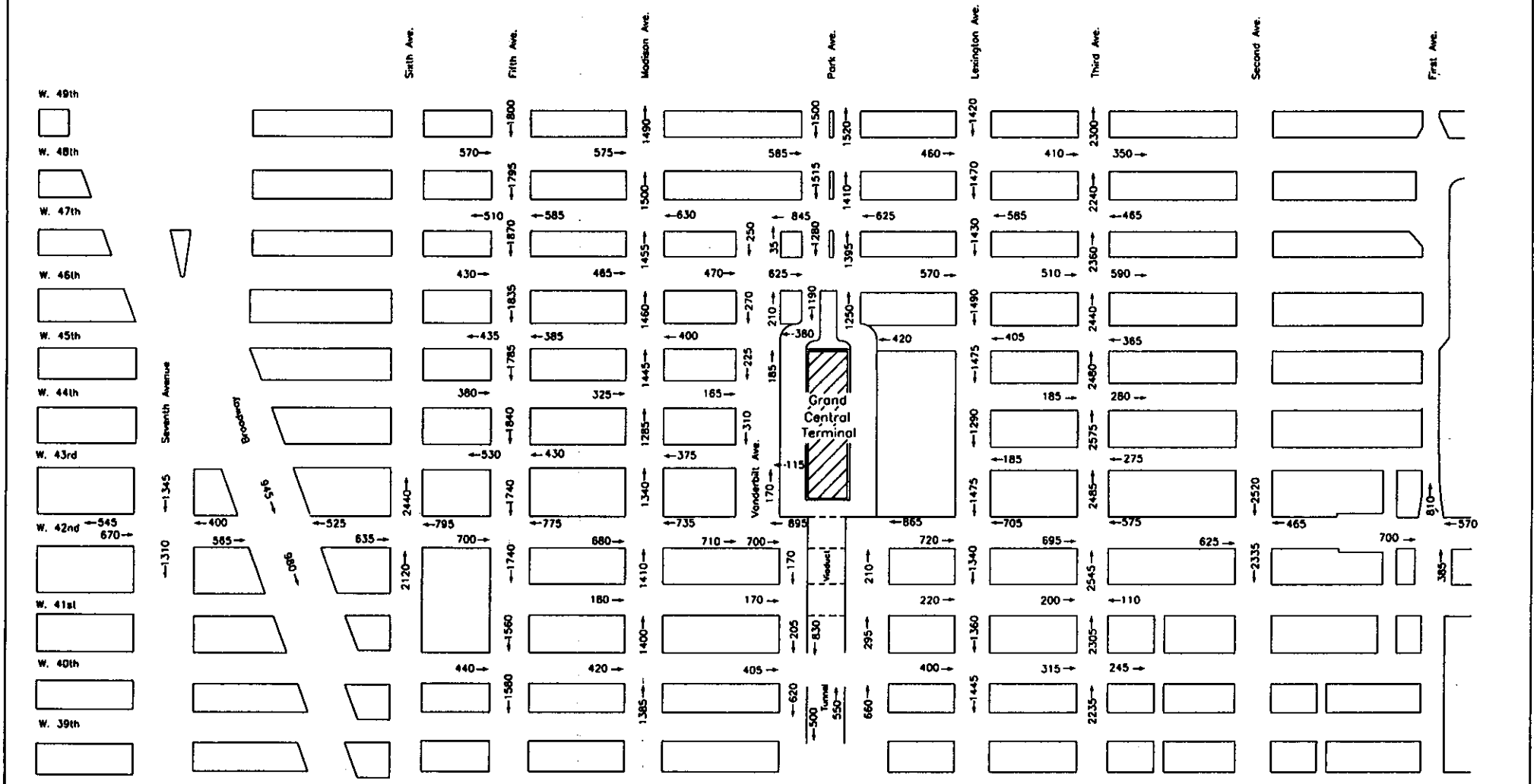
Table L-1 Existing LIRR Station Area Traffic Levels of Service
Table L-2 2010 No Build LIRR Station Area Traffic Levels of Service
Table L-3 2010 Build LIRR Station Area Traffic Levels of Service
Table L-4 2010 Mitigated Build LIRR Station Area Traffic Levels of Service (AM Peak Hour)
Table L-5 2010 Mitigated Build LIRR Station Area Traffic Levels of Service (PM Peak Hour)

FIGURE M-1

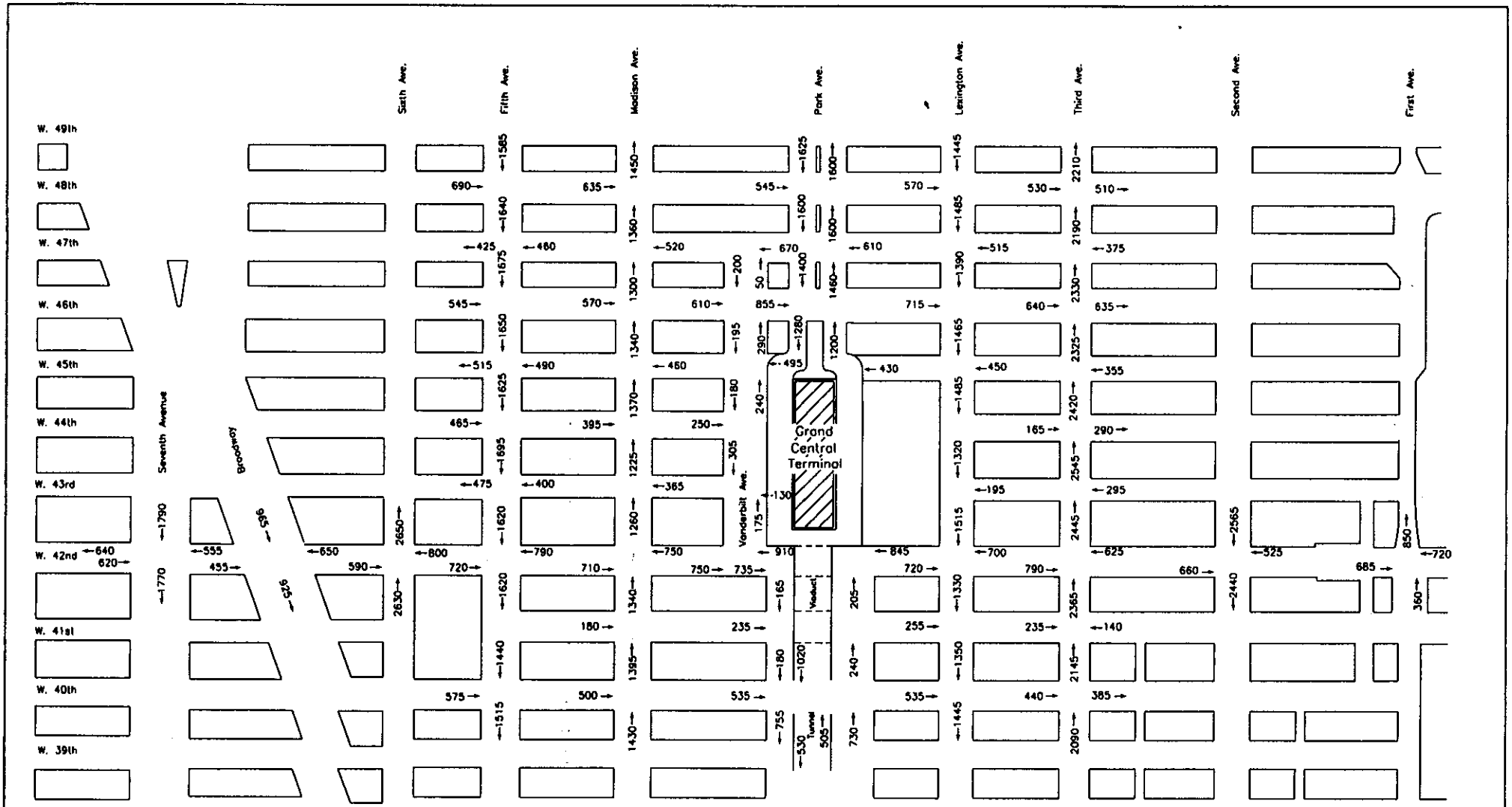
EXISTING TRAFFIC VOLUMES



INTERSECTION APPROACH VOLUMES : EXISTING AM PEAK



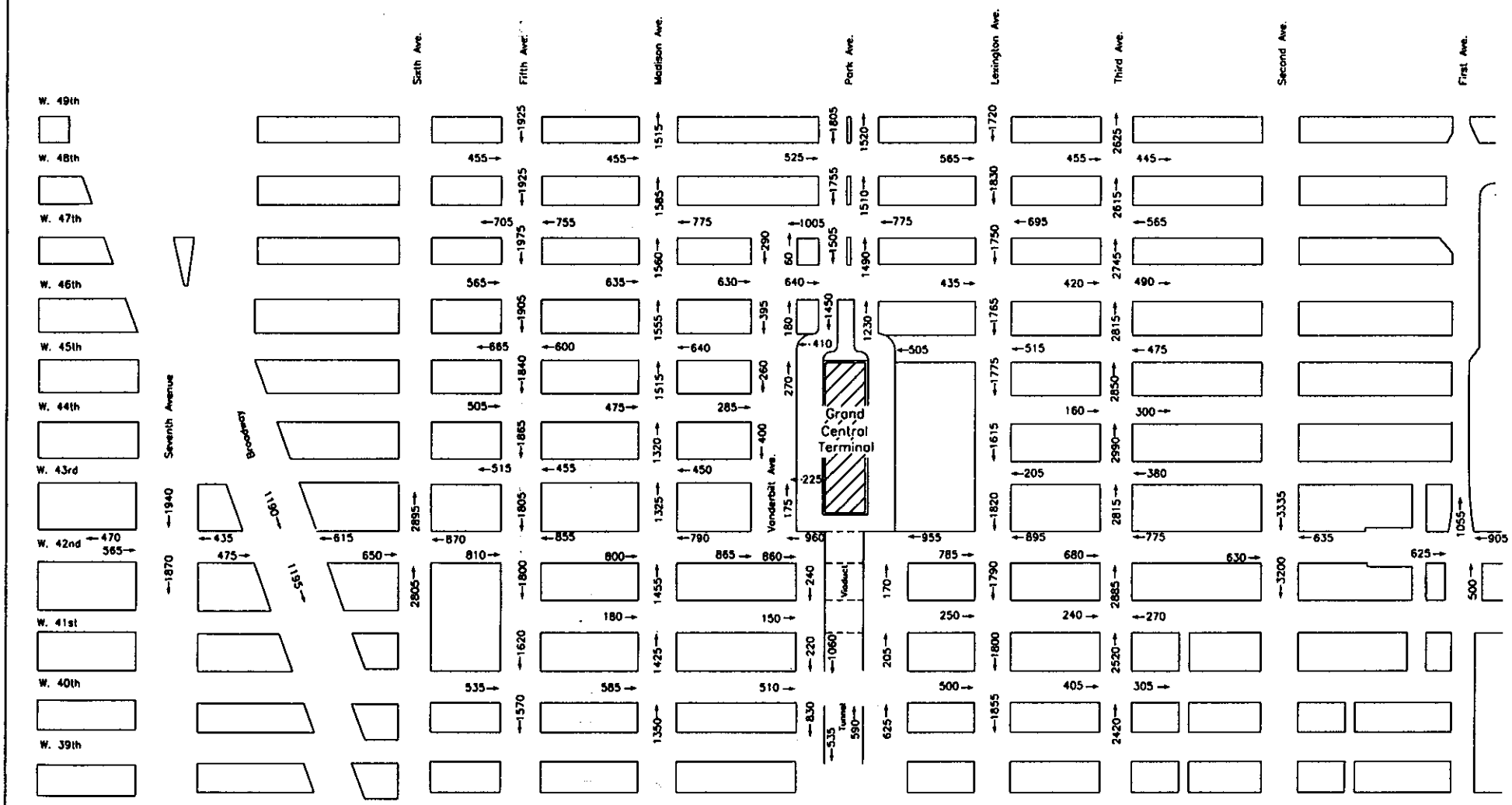
INTERSECTION APPROACH VOLUMES : EXISTING MIDDAY PEAK



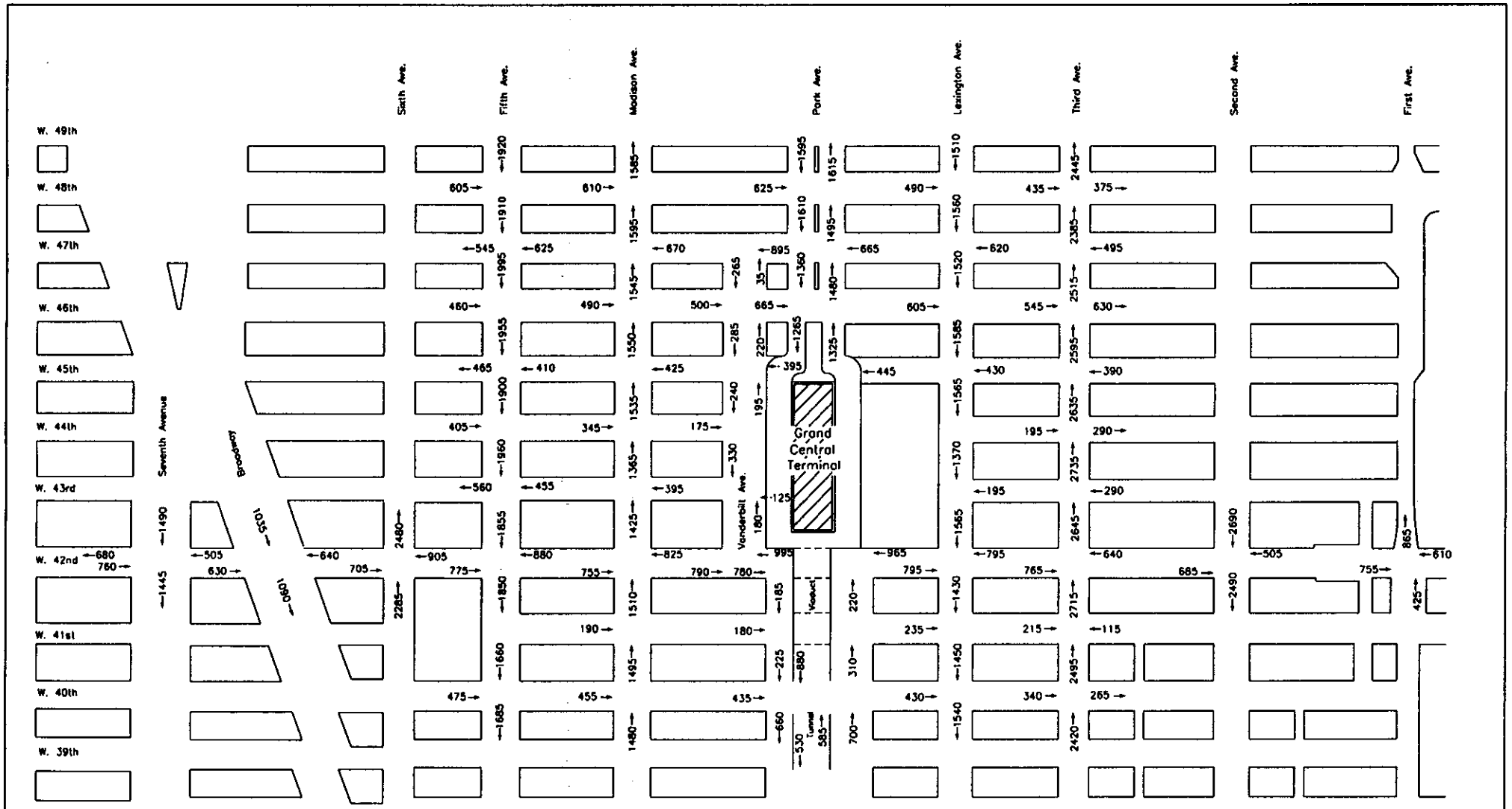
INTERSECTION APPROACH VOLUMES : EXISTING PM PEAK

FIGURE M-2

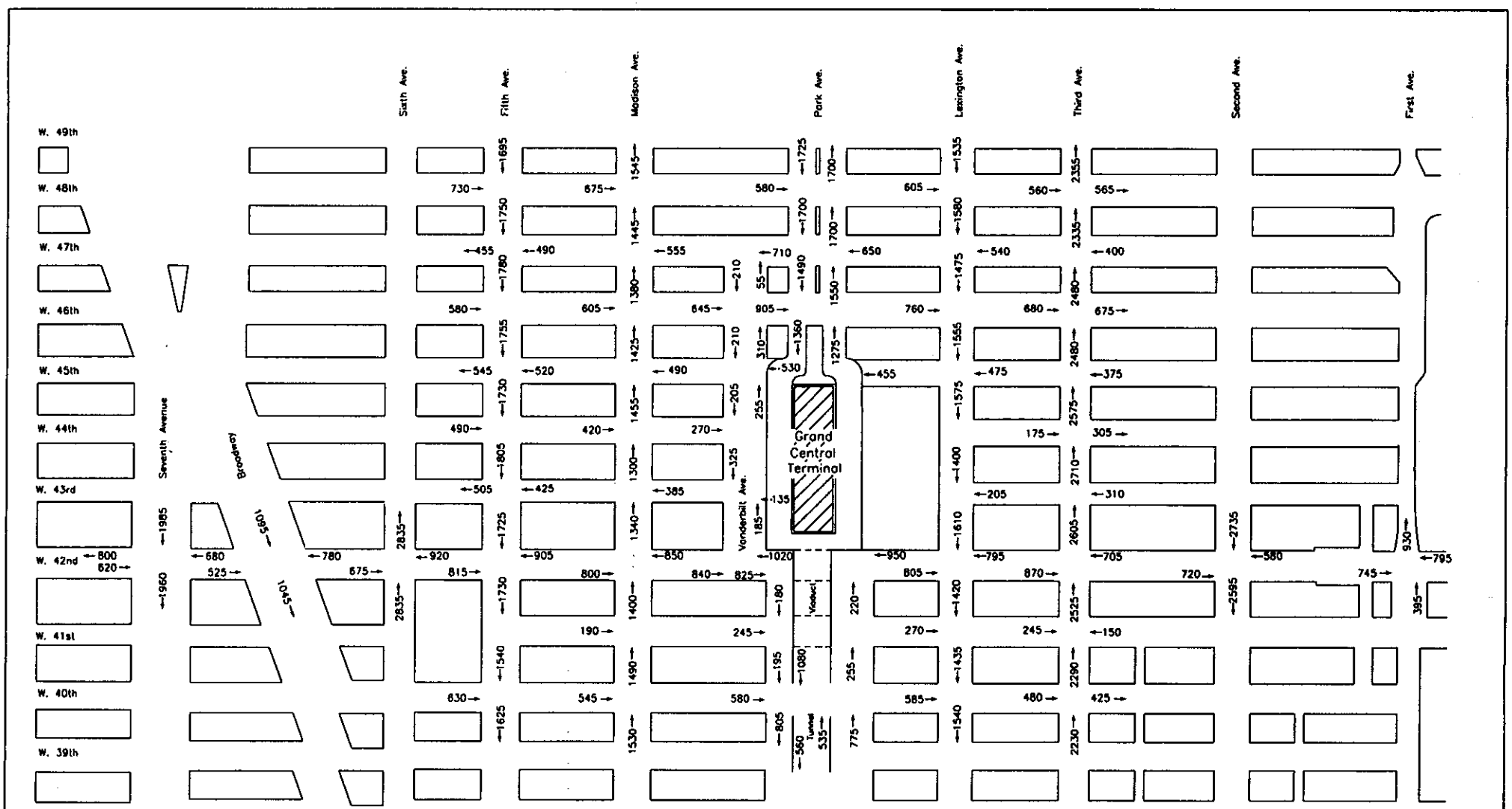
2010 NO BUILD TRAFFIC VOLUMES



INTERSECTION APPROACH VOLUMES : NO BUILD AM PEAK



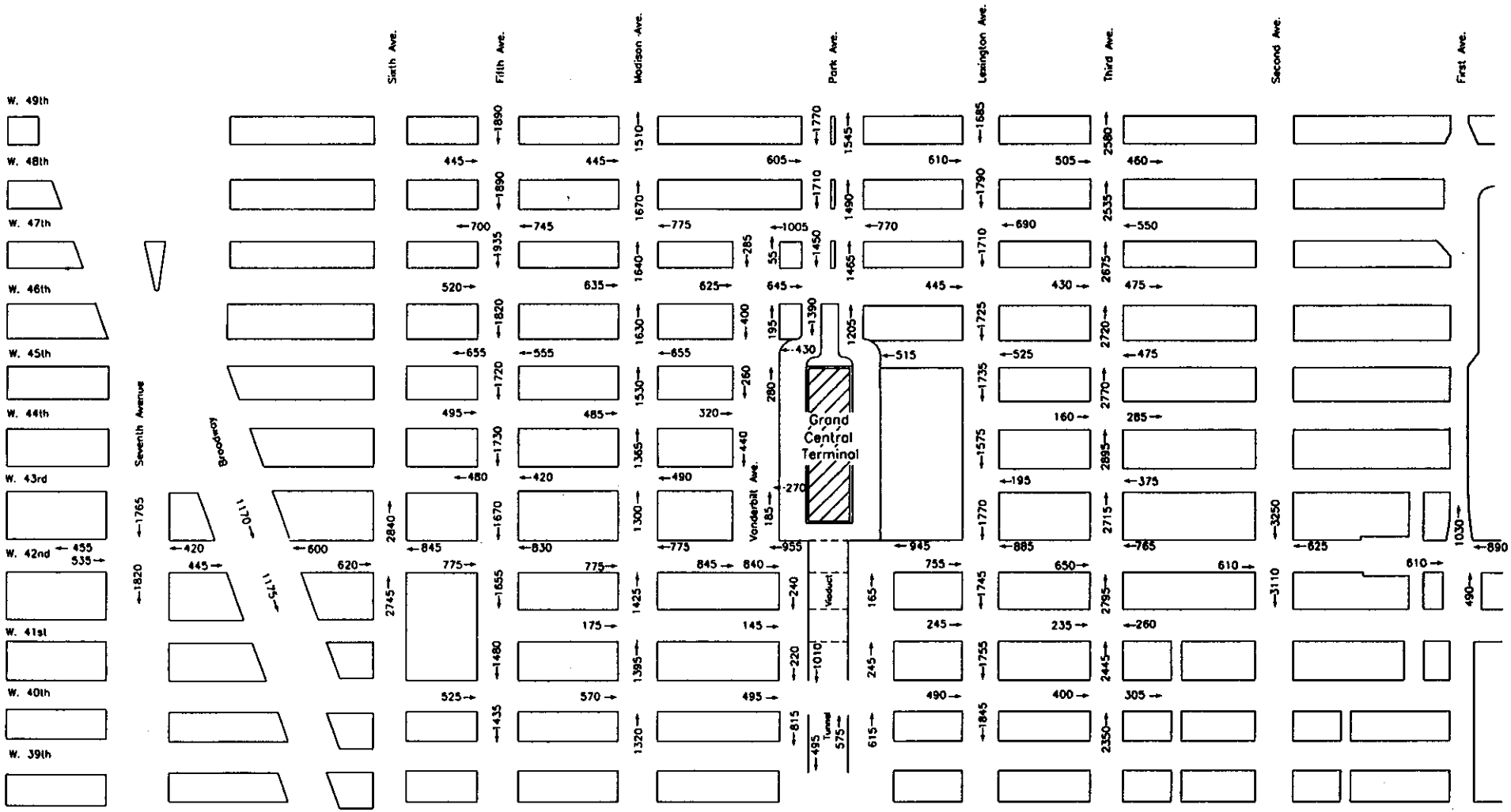
INTERSECTION APPROACH VOLUMES : NO BUILD MIDDAY PEAK



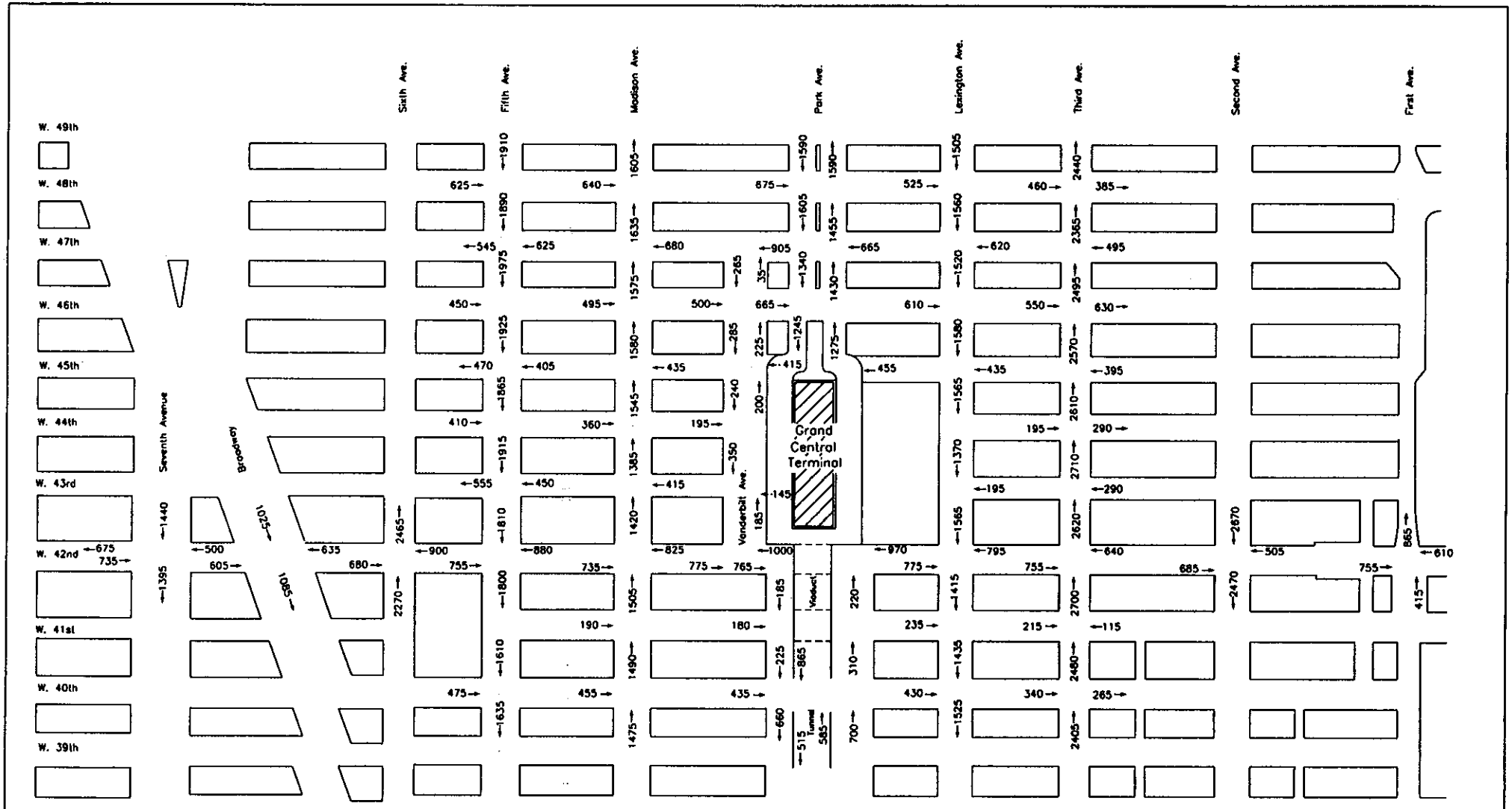
INTERSECTION APPROACH VOLUMES : NO BUILD PM PEAK

FIGURE M-3

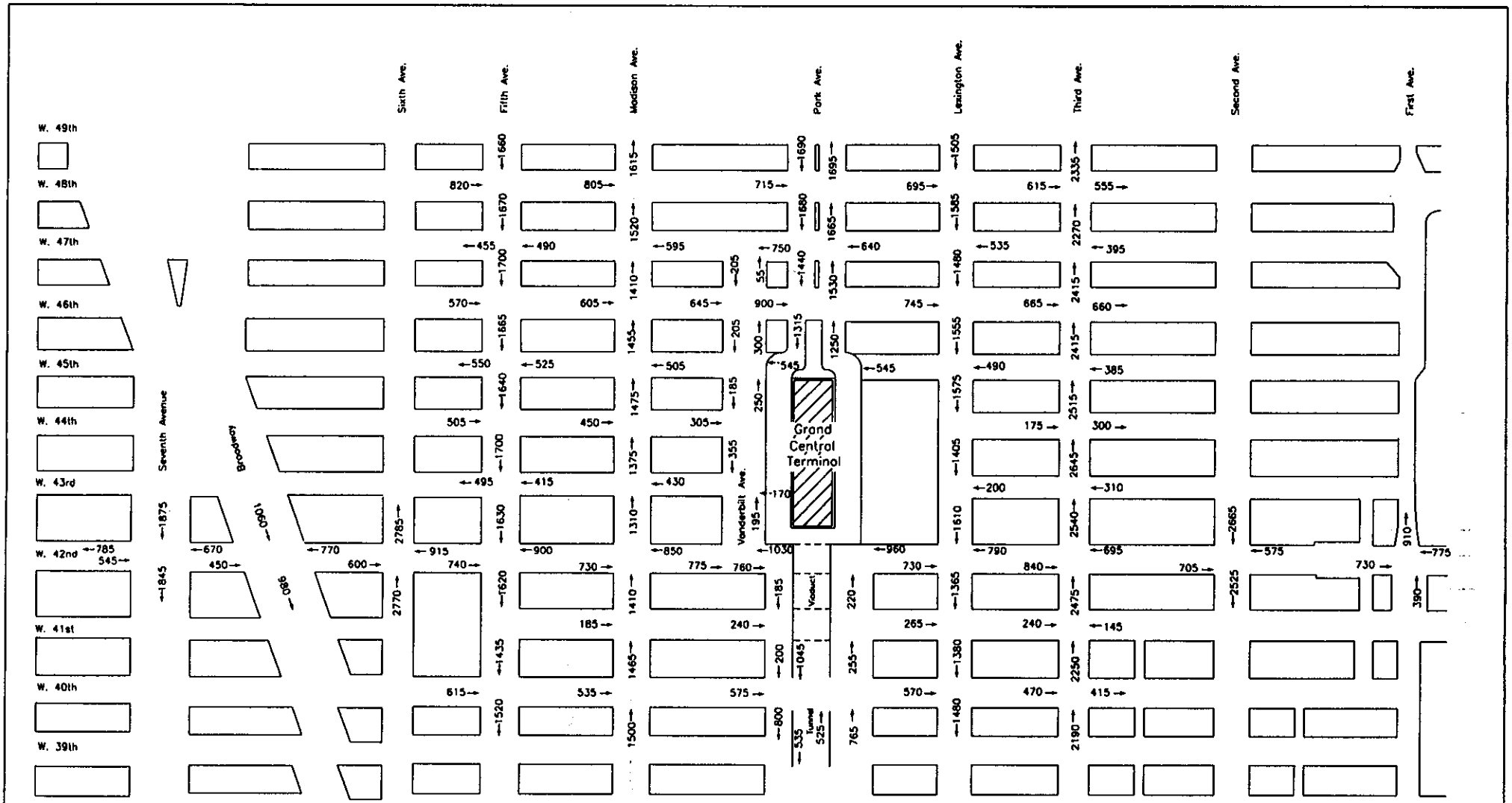
2010 BUILD TRAFFIC VOLUMES



INTERSECTION APPROACH VOLUMES : BUILD AM PEAK



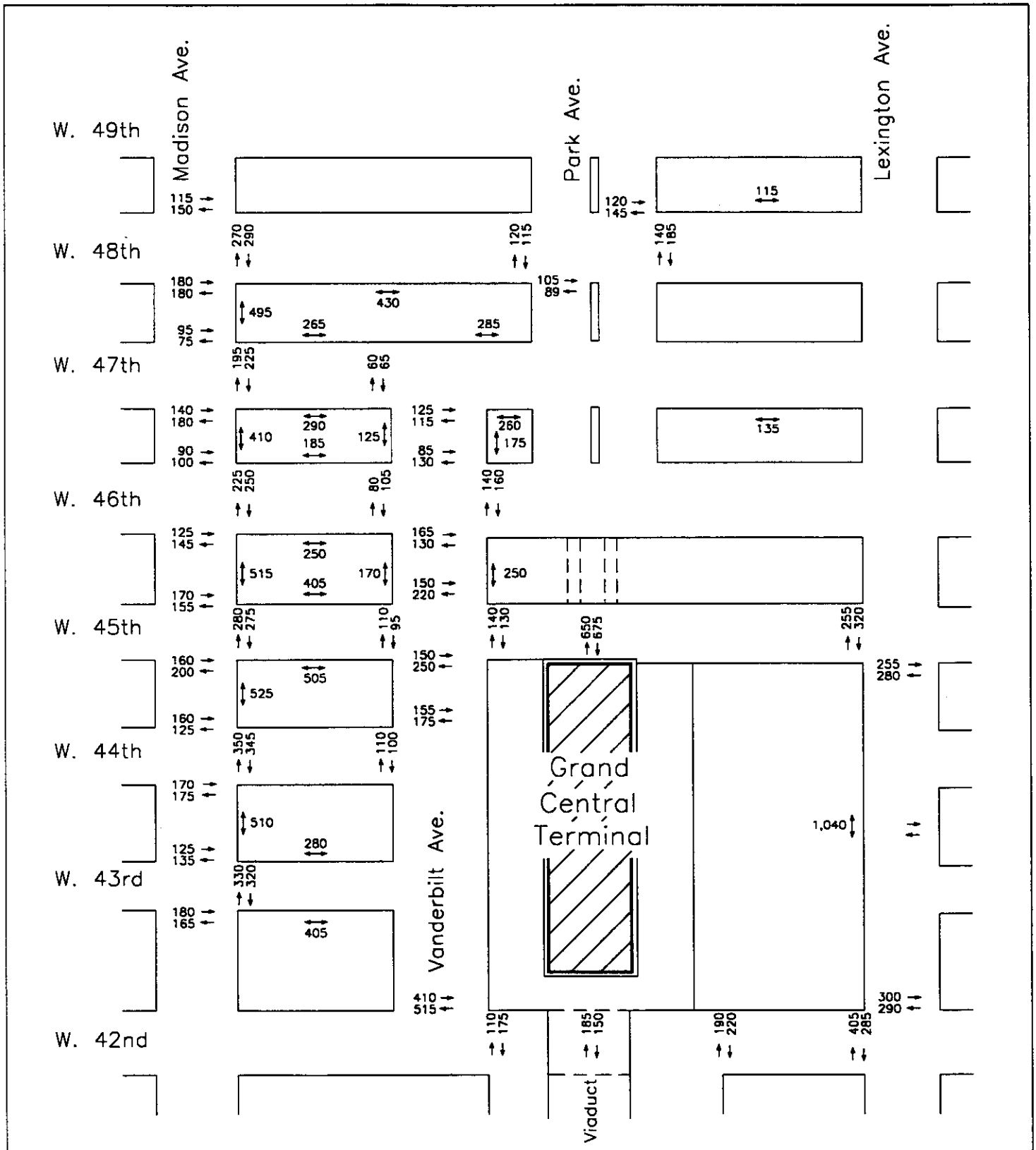
INTERSECTION APPROACH VOLUMES : BUILD MIDDAY PEAK



INTERSECTION APPROACH VOLUMES : BUILD PM PEAK

FIGURE M-4

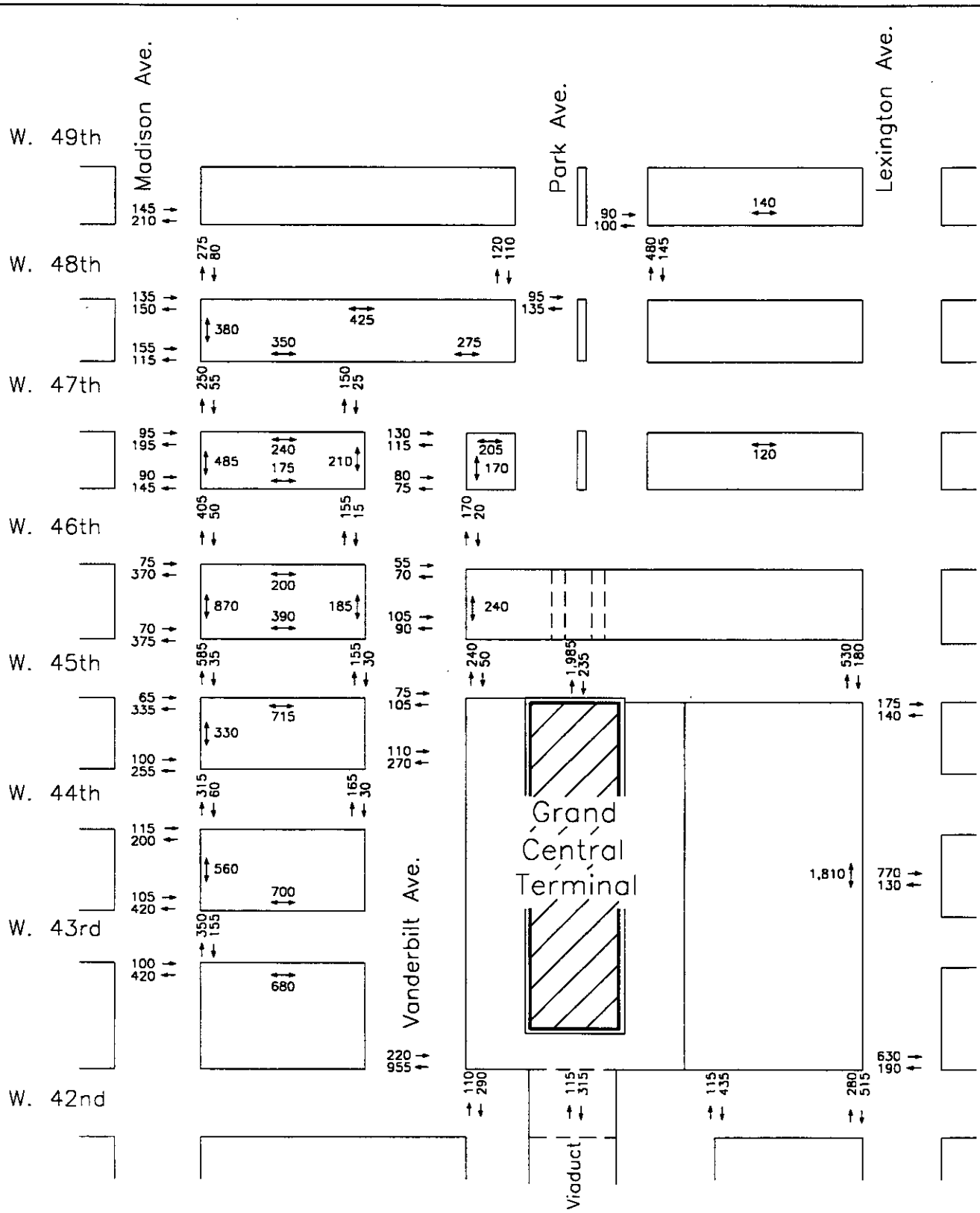
EXISTING GCT EXTERNAL PEDESTRIAN VOLUMES



LIRR–GCT
EAST SIDE ACCESS

EXISTING PEDESTRIAN VOLUMES
MIDDAY PEAK 15 MINUTES

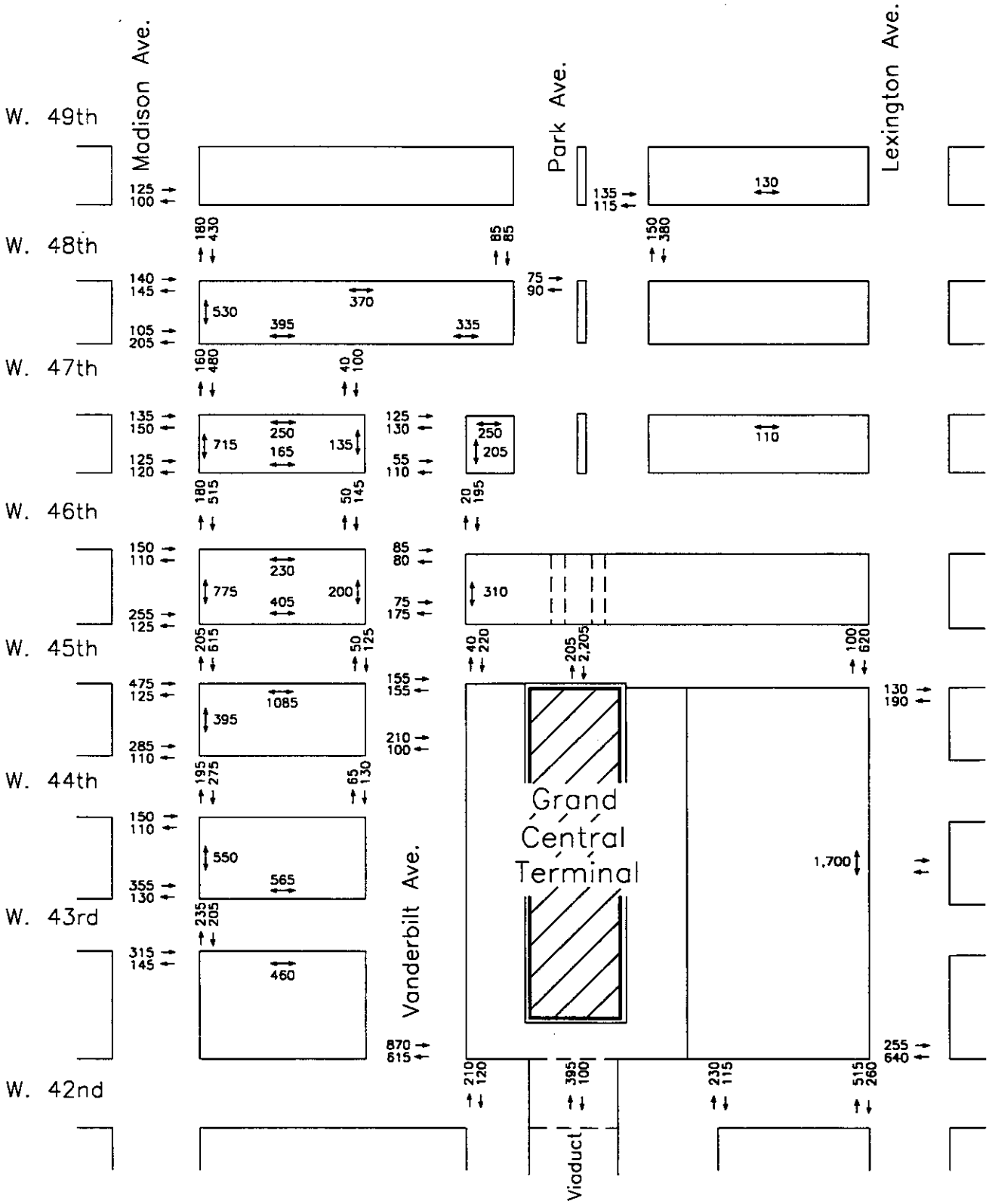
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



LIRR–GCT
EAST SIDE ACCESS

EXISTING PEDESTRIAN VOLUMES
AM PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



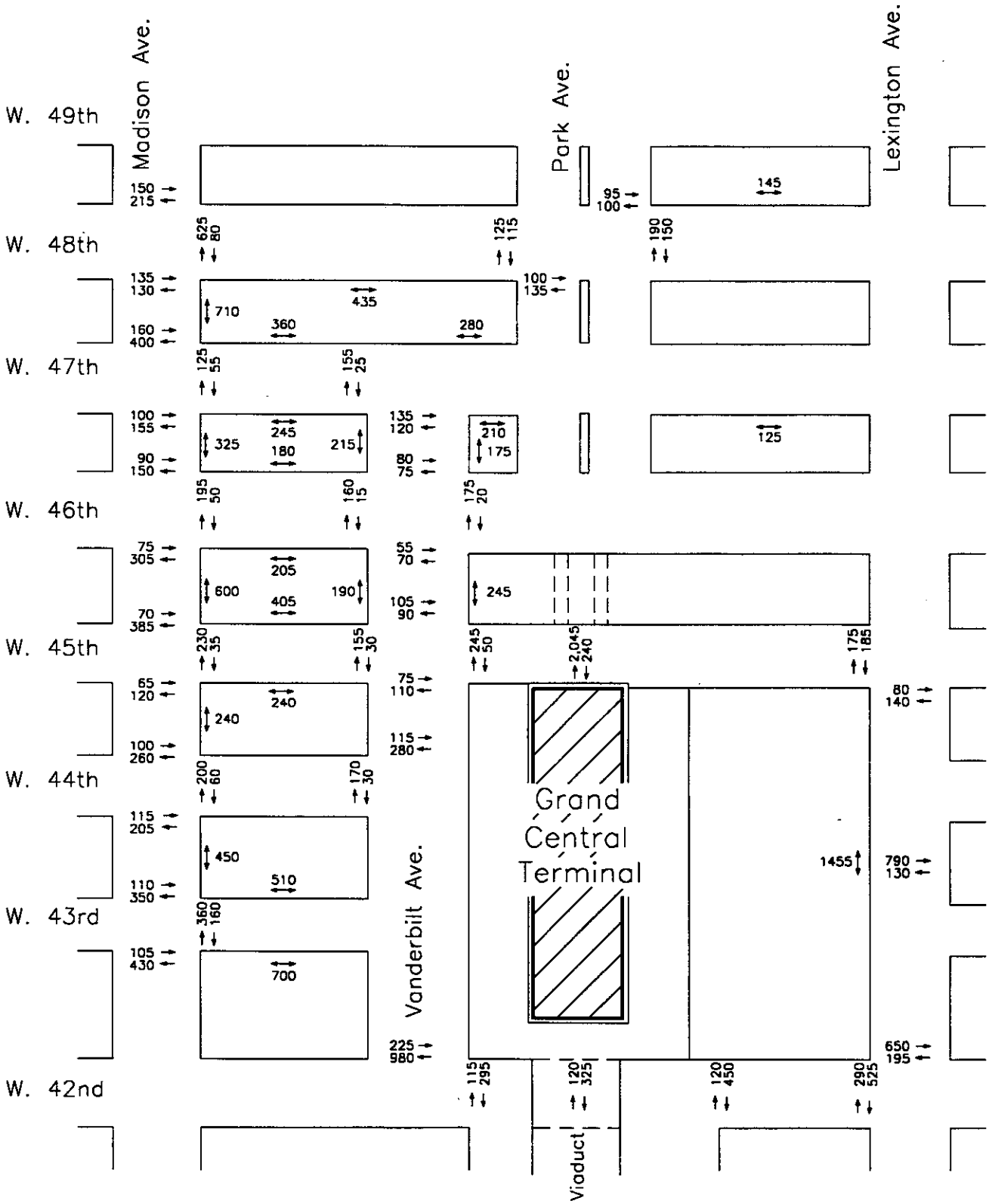
LIRR–GCT
EAST SIDE ACCESS

EXISTING PEDESTRIAN VOLUMES
PM PEAK 15 MINUTES

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Traffic and Transportation Consultants

FIGURE M-5

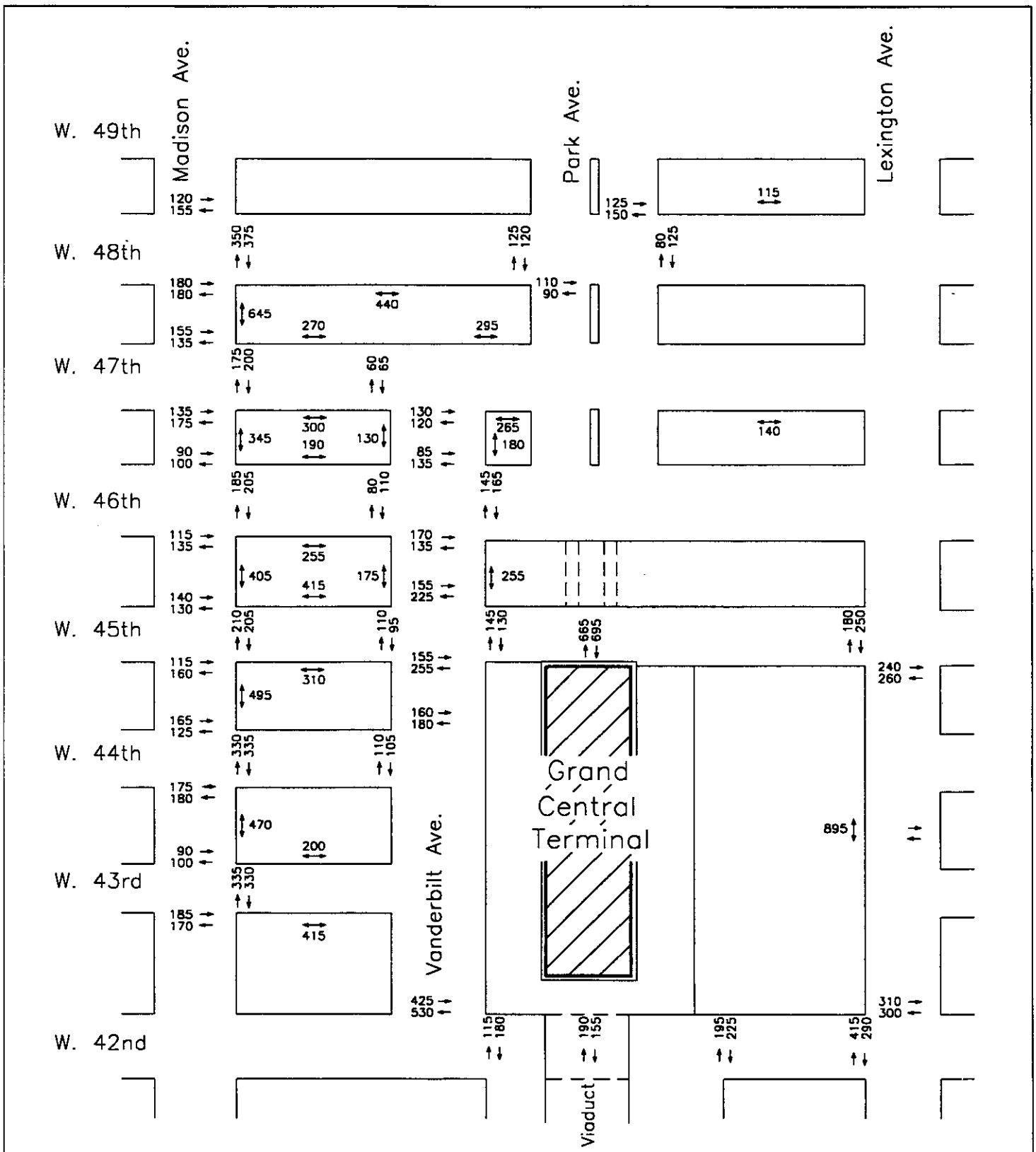
2010 NO BUILD
GCT EXTERNAL
PEDESTRIAN VOLUMES



LIRR–GCT
EAST SIDE ACCESS

2010 NO BUILD PEDESTRIAN VOLUMES
AM PEAK 15 MINUTES

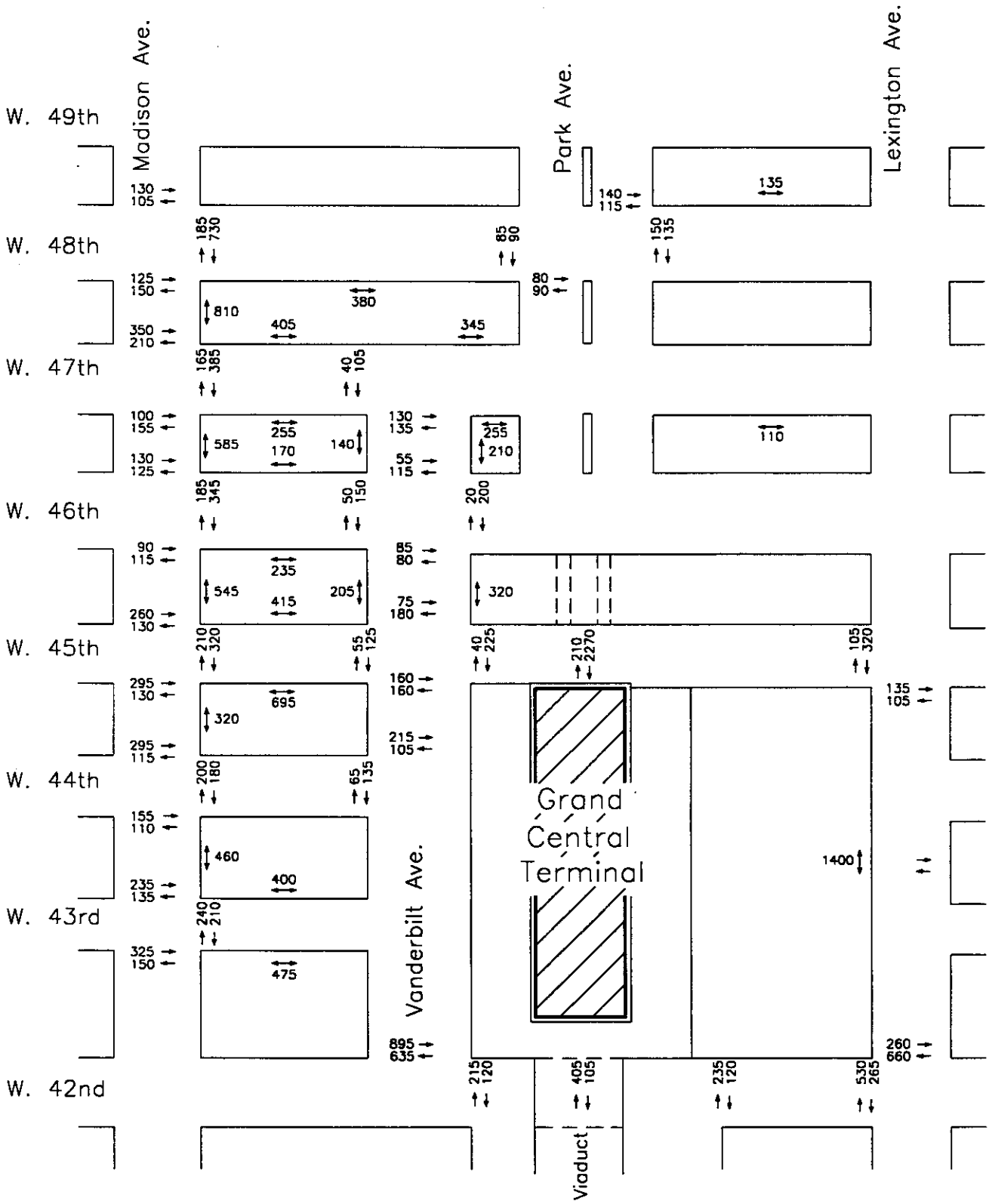
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



LIRR–GCT
EAST SIDE ACCESS

2010 NO BUILD PEDESTRIAN VOLUMES
MIDDAY PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



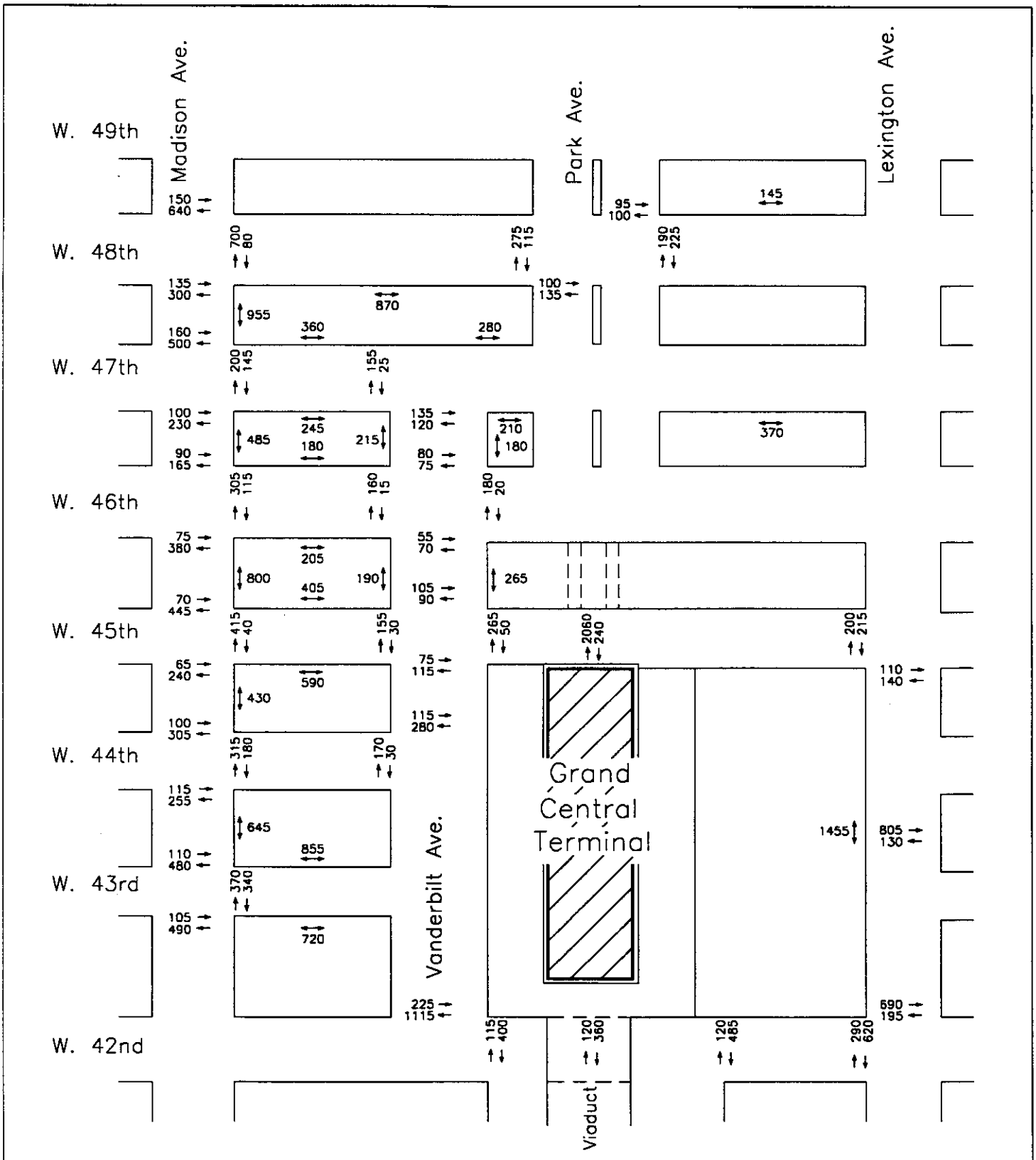
LIRR–GCT
EAST SIDE ACCESS

2010 NO BUILD PEDESTRIAN VOLUMES
PM PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE M-6

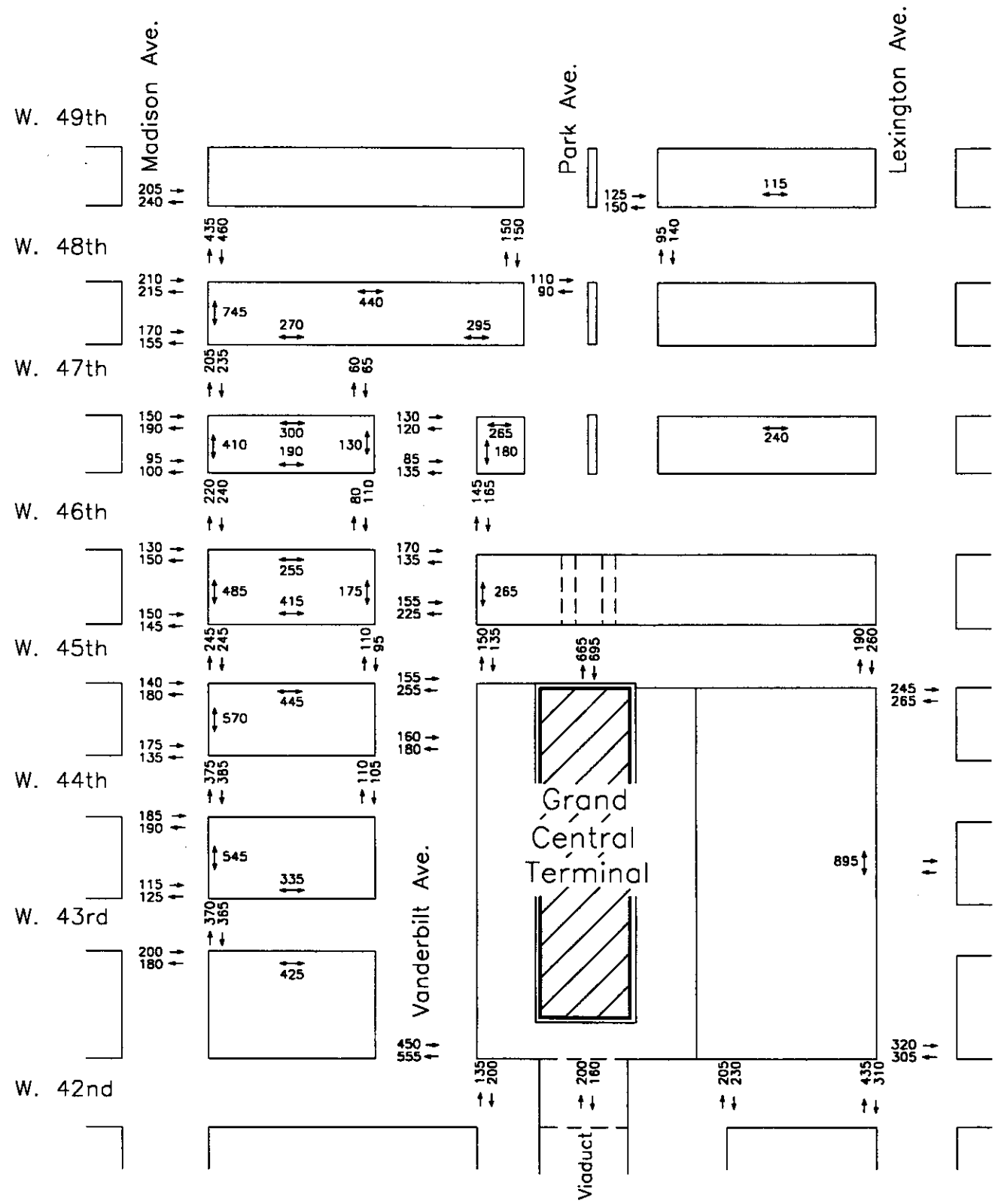
2010 BUILD
GCT EXTERNAL
PEDESTRIAN VOLUMES



LIRR–GCT
EAST SIDE ACCESS

2010 BUILD PEDESTRIAN VOLUMES
AM PEAK 15 MINUTES

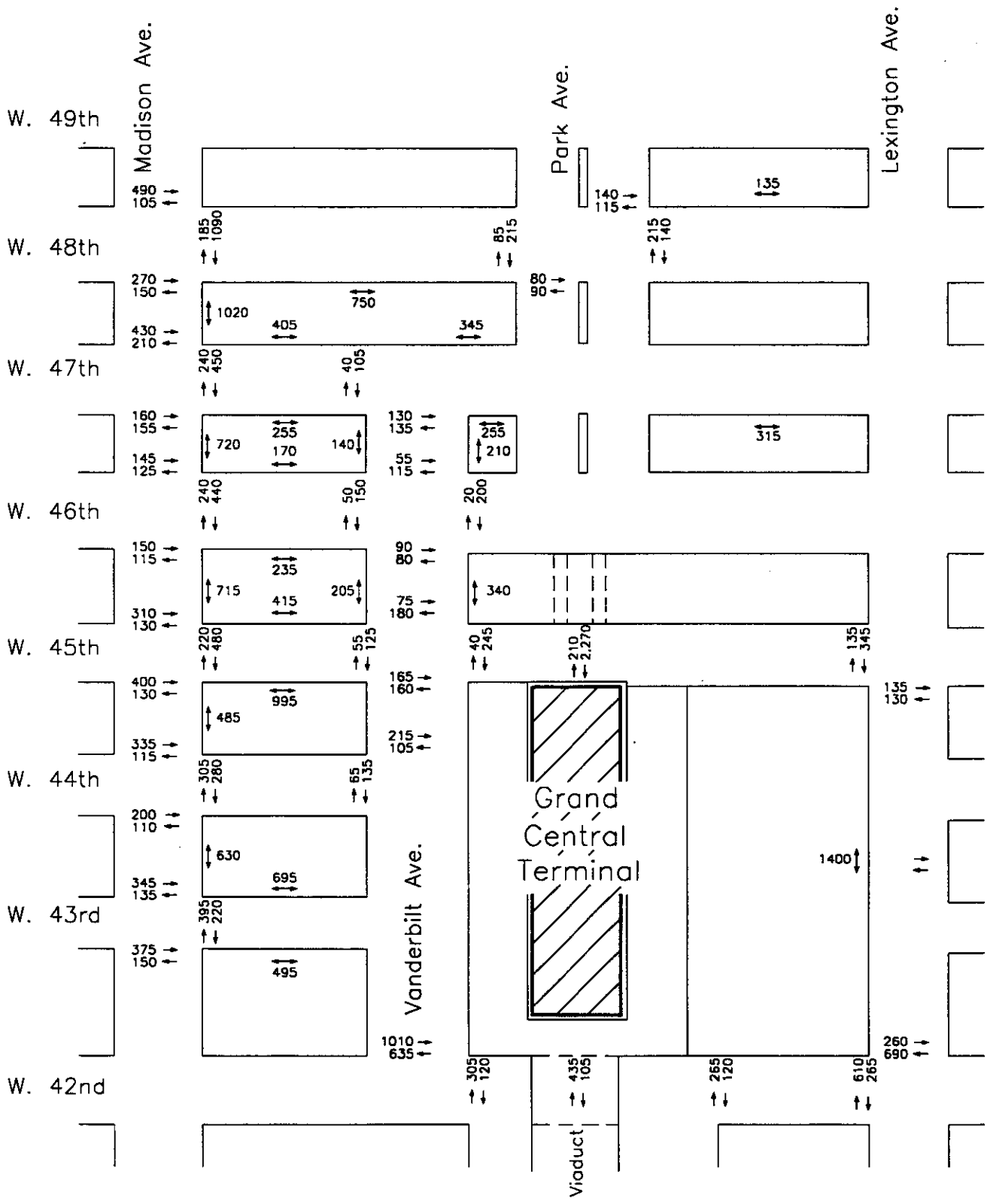
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



LIRR–GCT
EAST SIDE ACCESS

2010 BUILD PEDESTRIAN VOLUMES
MIDDAY PEAK 15 MINUTES

Eng-Wong, Taub & Associates
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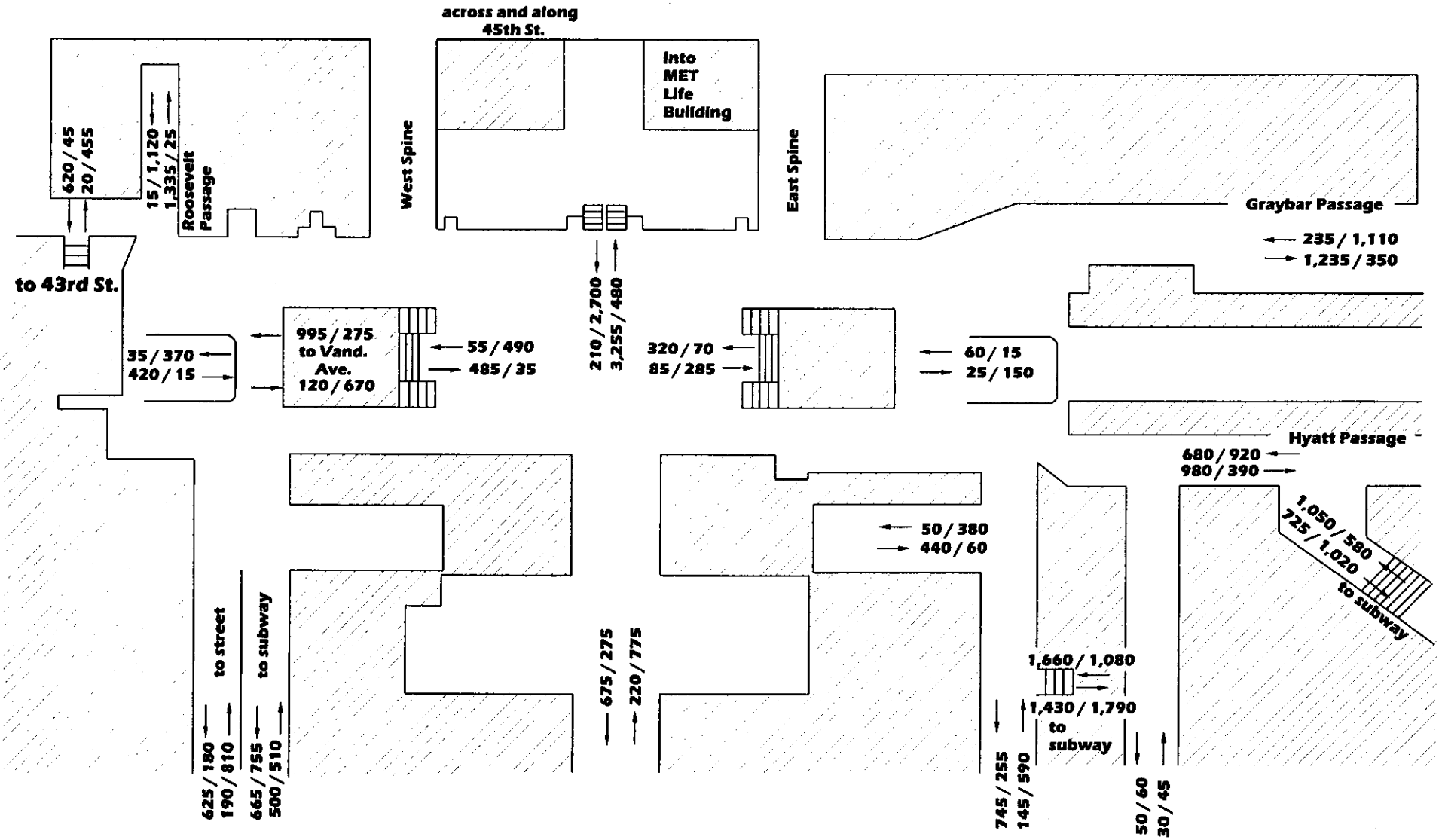
LIRR–GCT
EAST SIDE ACCESS

2010 BUILD PEDESTRIAN VOLUMES
PM PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE M-7

GCT UPPER CONCOURSE PEDESTRIAN VOLUMES



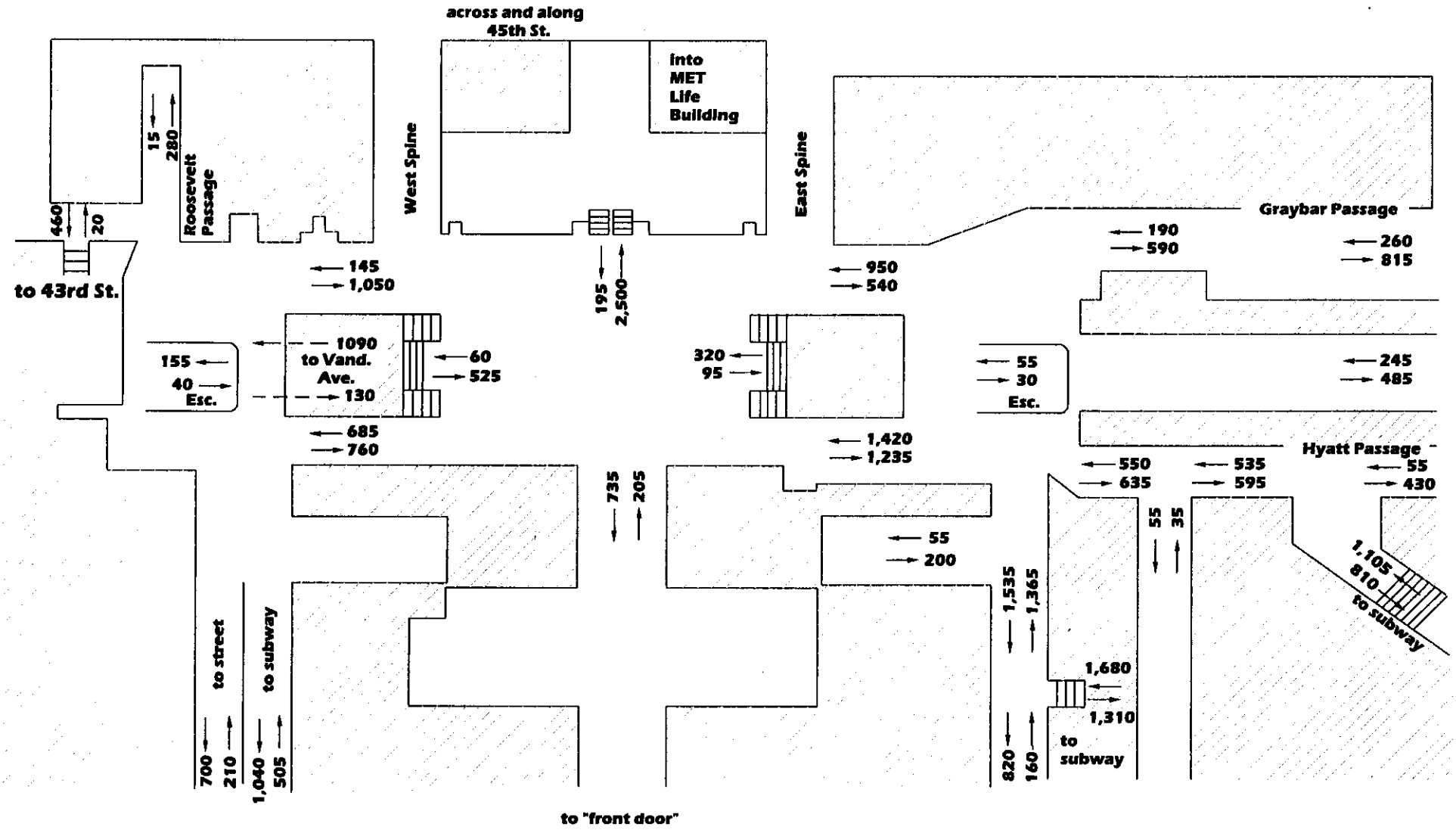
AM / PM

GCT UPPER CONCOURSE

1999 Existing Peak 15-Minute Pedestrian Flows

Eng-Wong, Taub & Associates

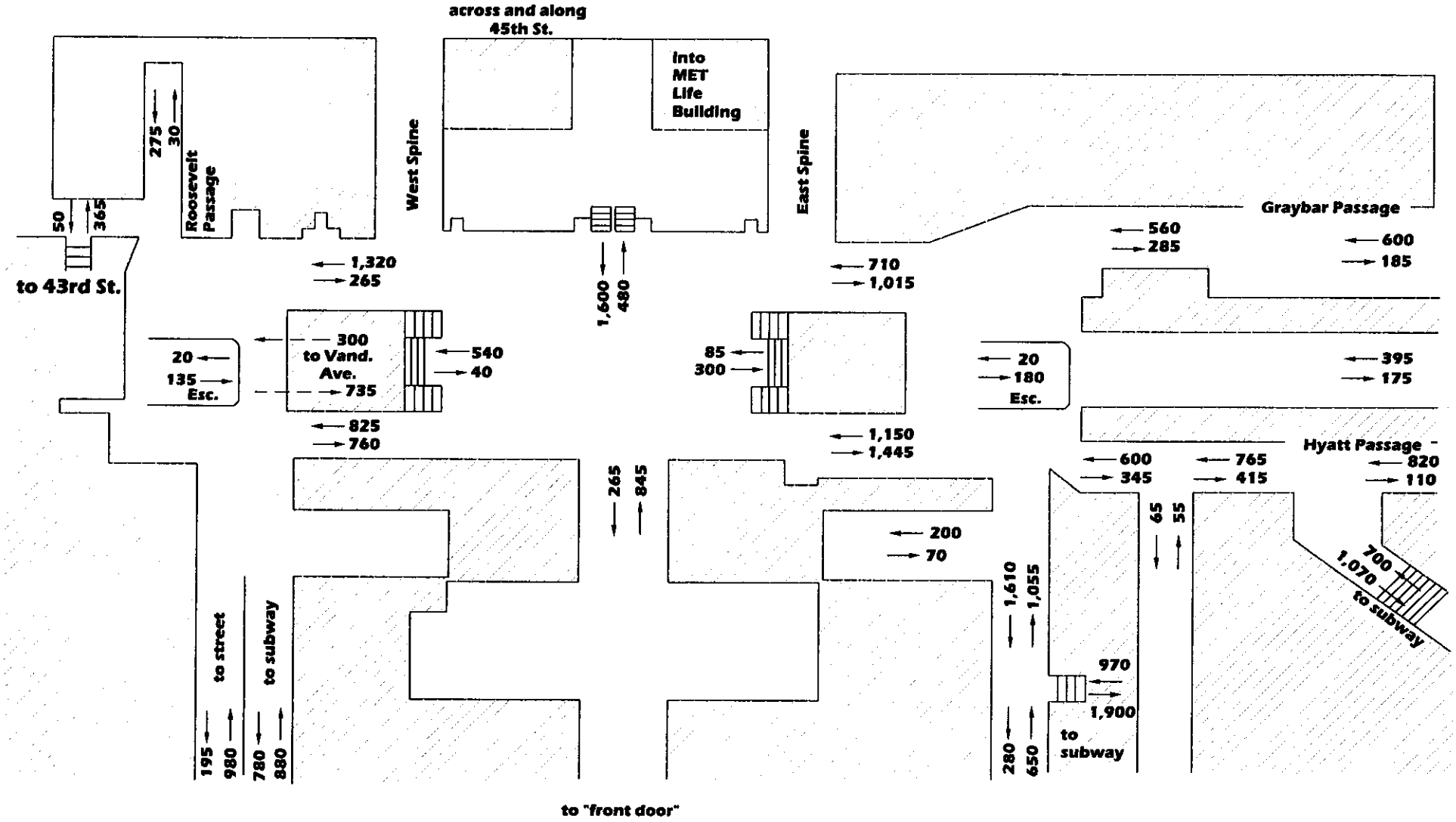
Traffic and Transportation Consultants



GCT UPPER CONCOURSE

2010 Future No Build Conditions
Pedestrian Flows
AM Peak 15 minutes

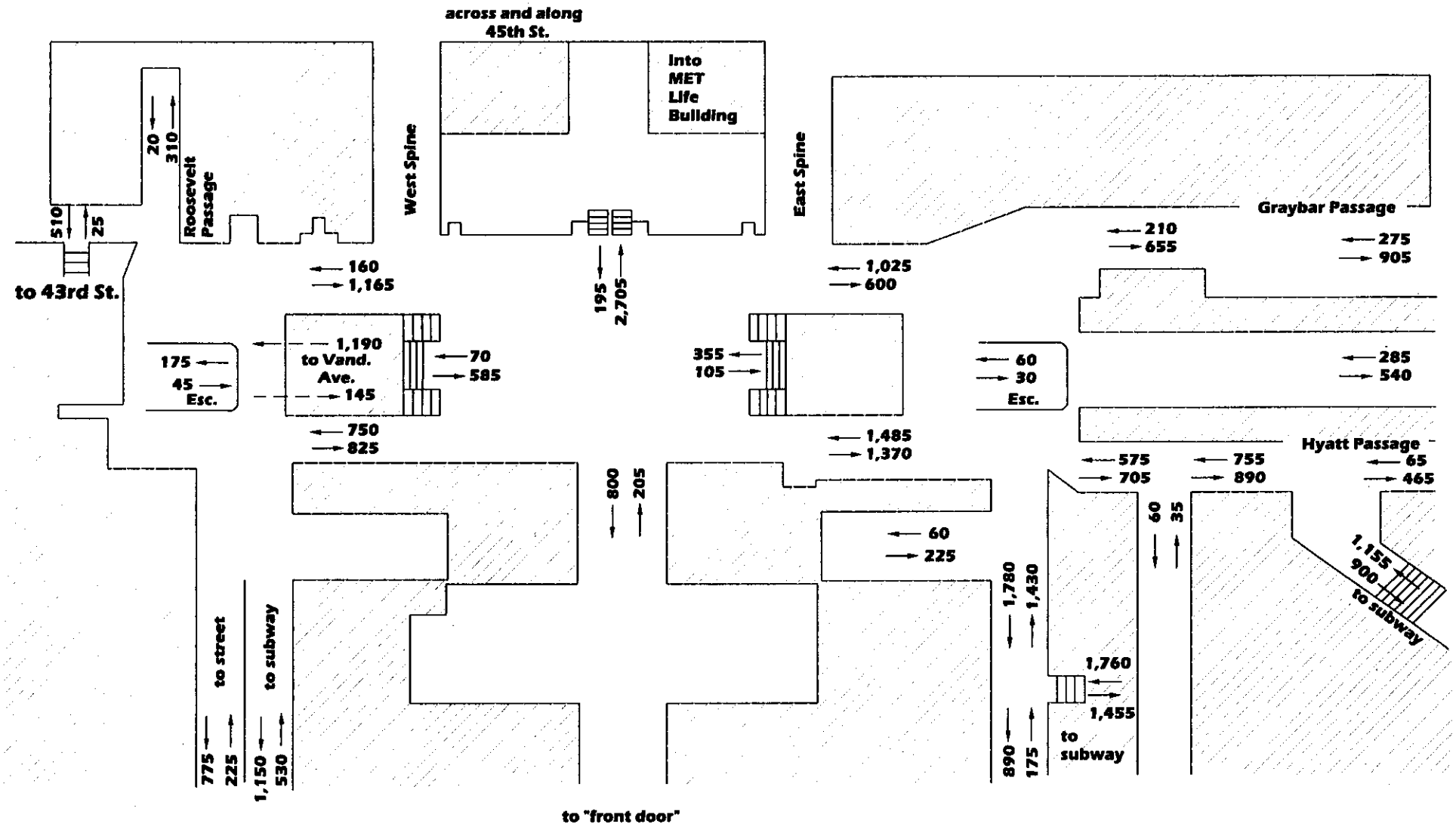
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



GCT UPPER CONCOURSE

2010 Future No Build Conditions
Pedestrian Flows
PM Peak 15 minutes

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

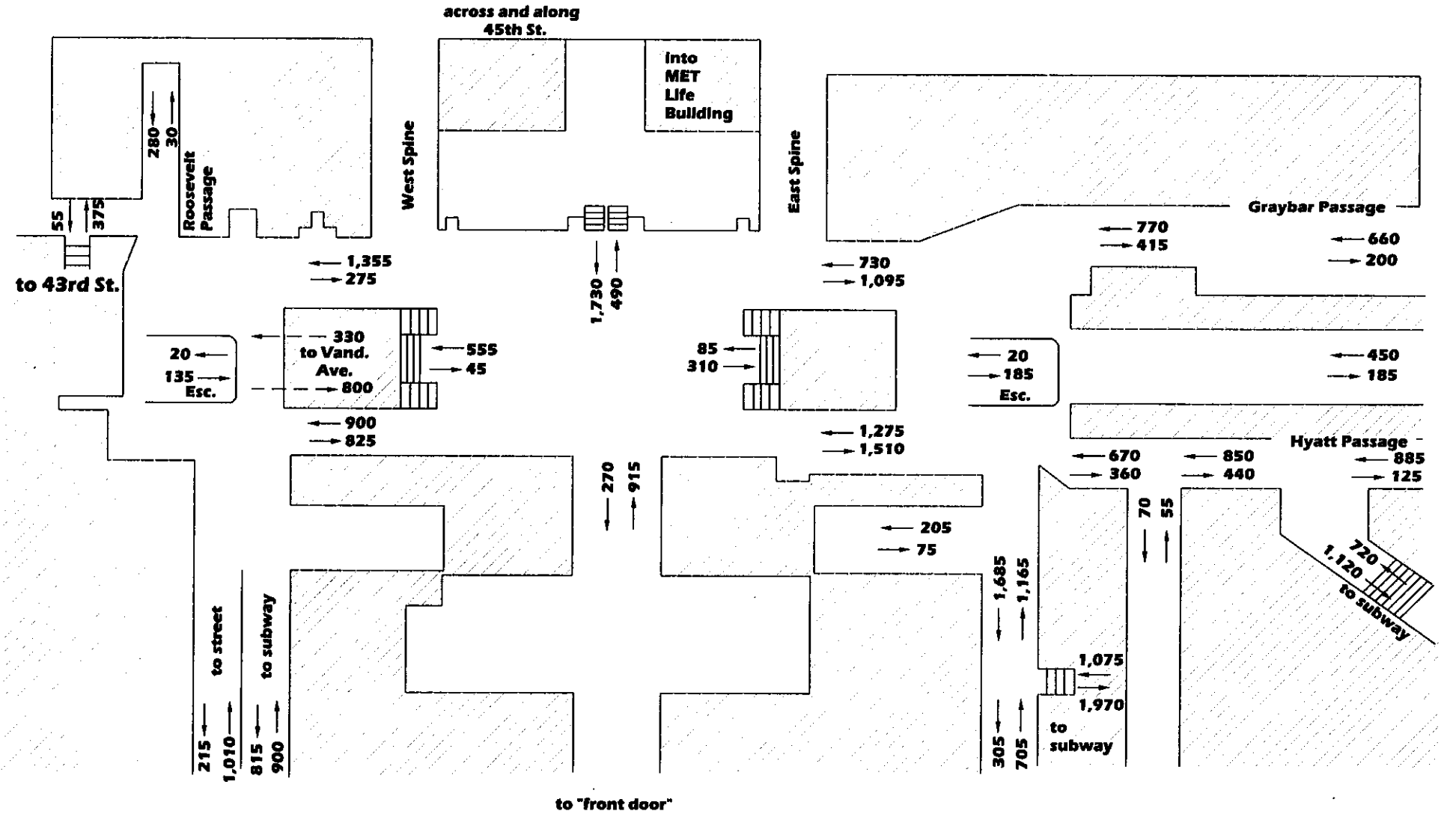


GCT UPPER CONCOURSE

2020 Future No Build Conditions
Pedestrian Flows
AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

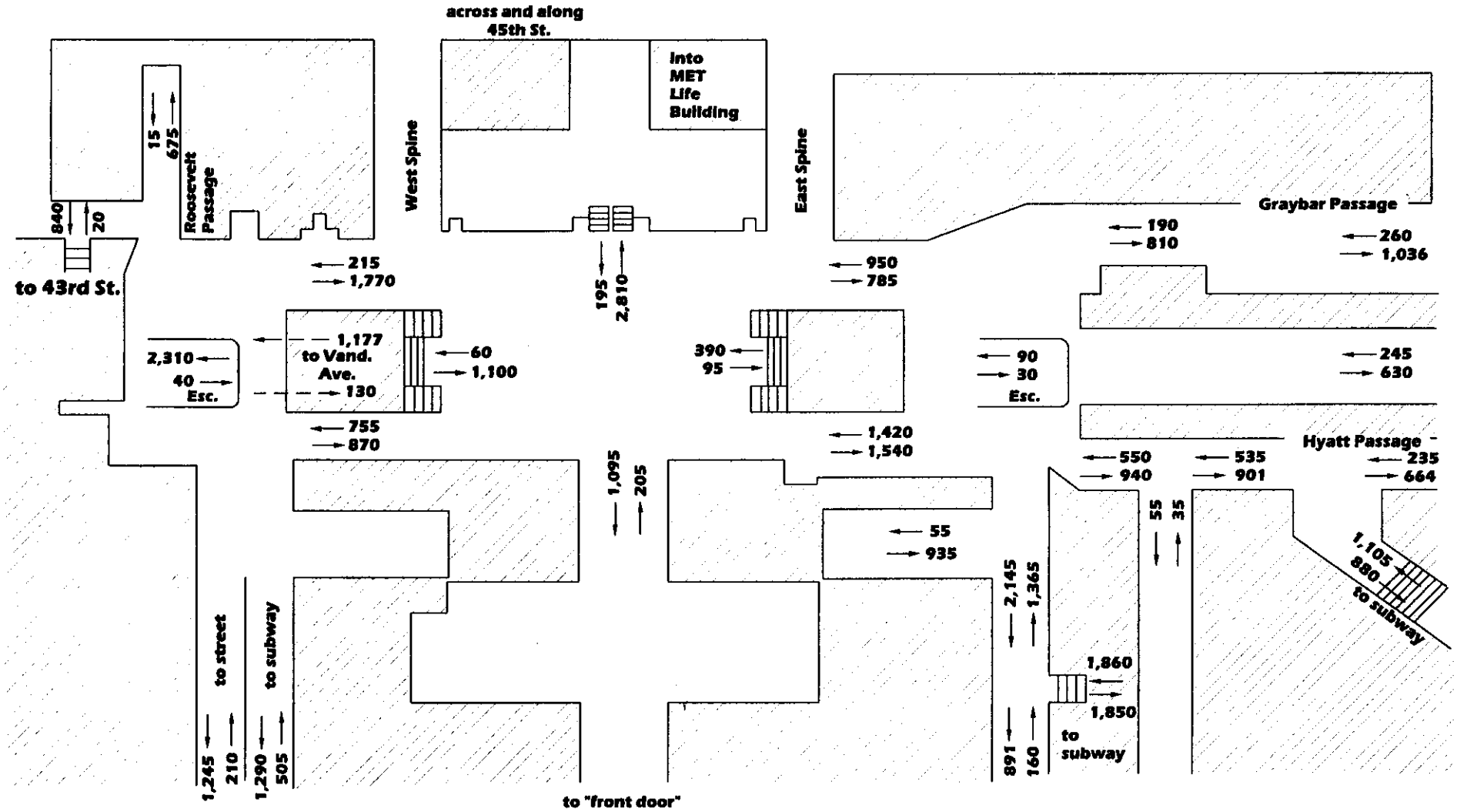


GCT UPPER CONCOURSE

2020 Future No Build Conditions
Pedestrian Flows
PM Peak 15 minutes

Eng-Wong, Taub & Associates

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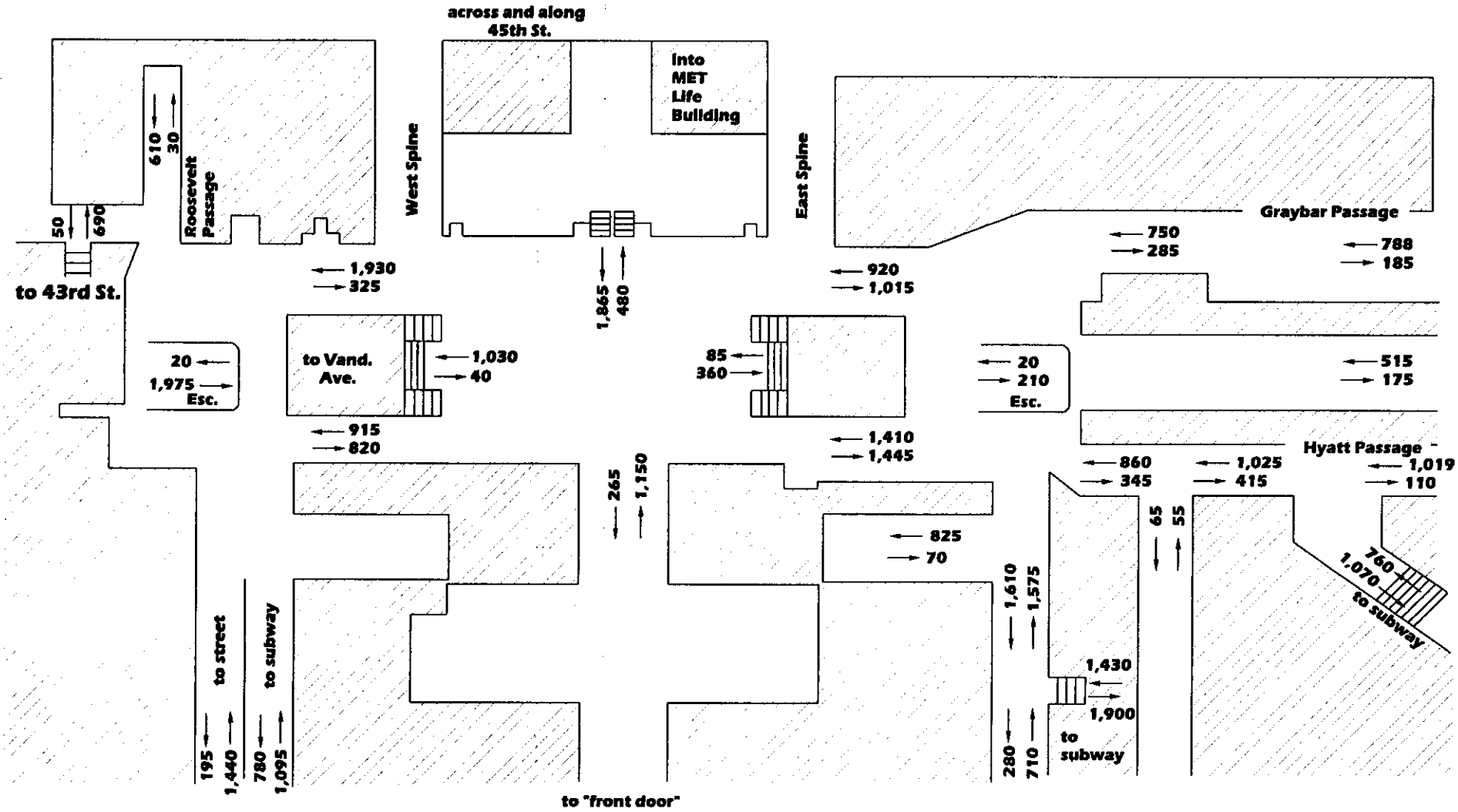
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2010 Future Build Conditions

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



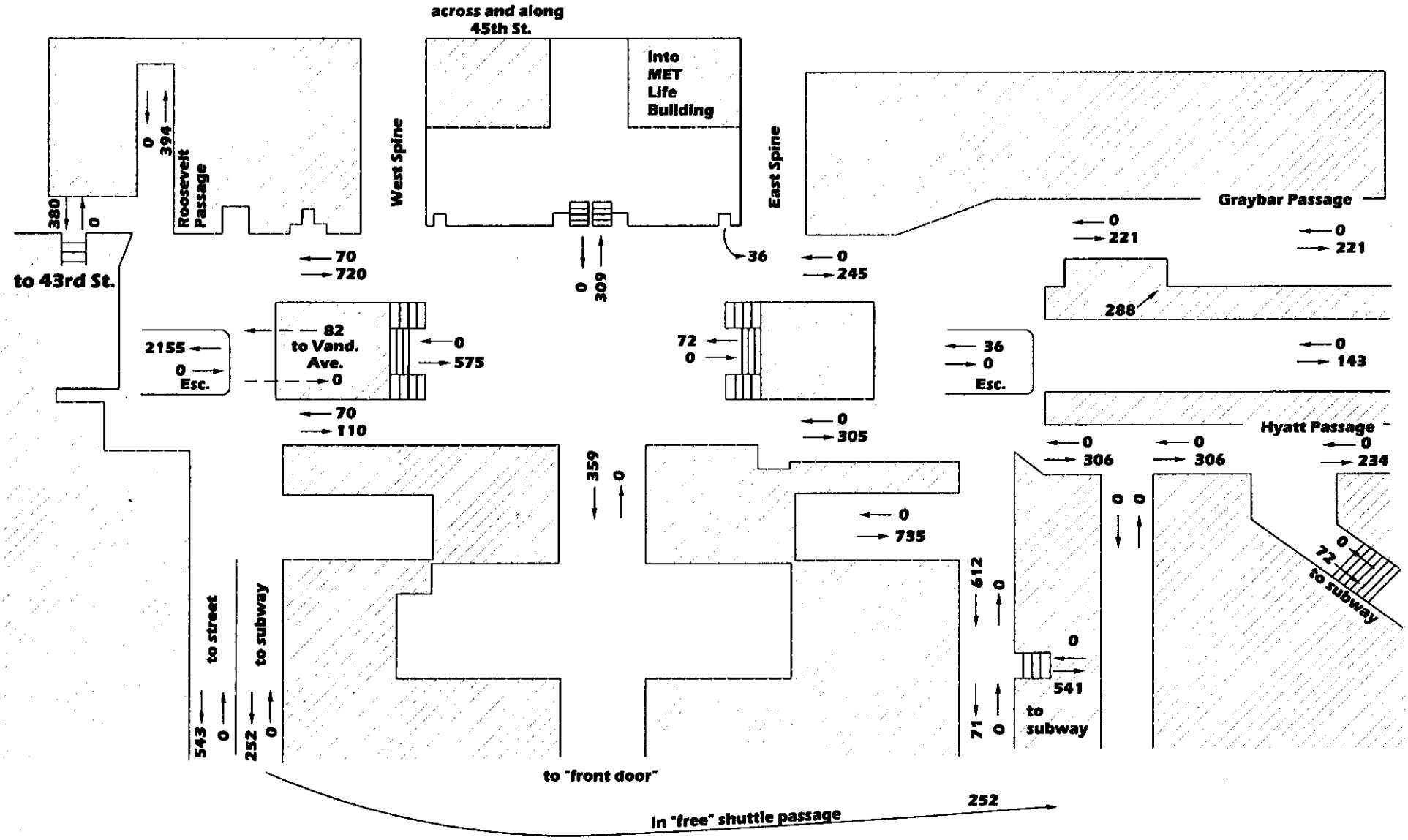
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2010 Future Build Conditions

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

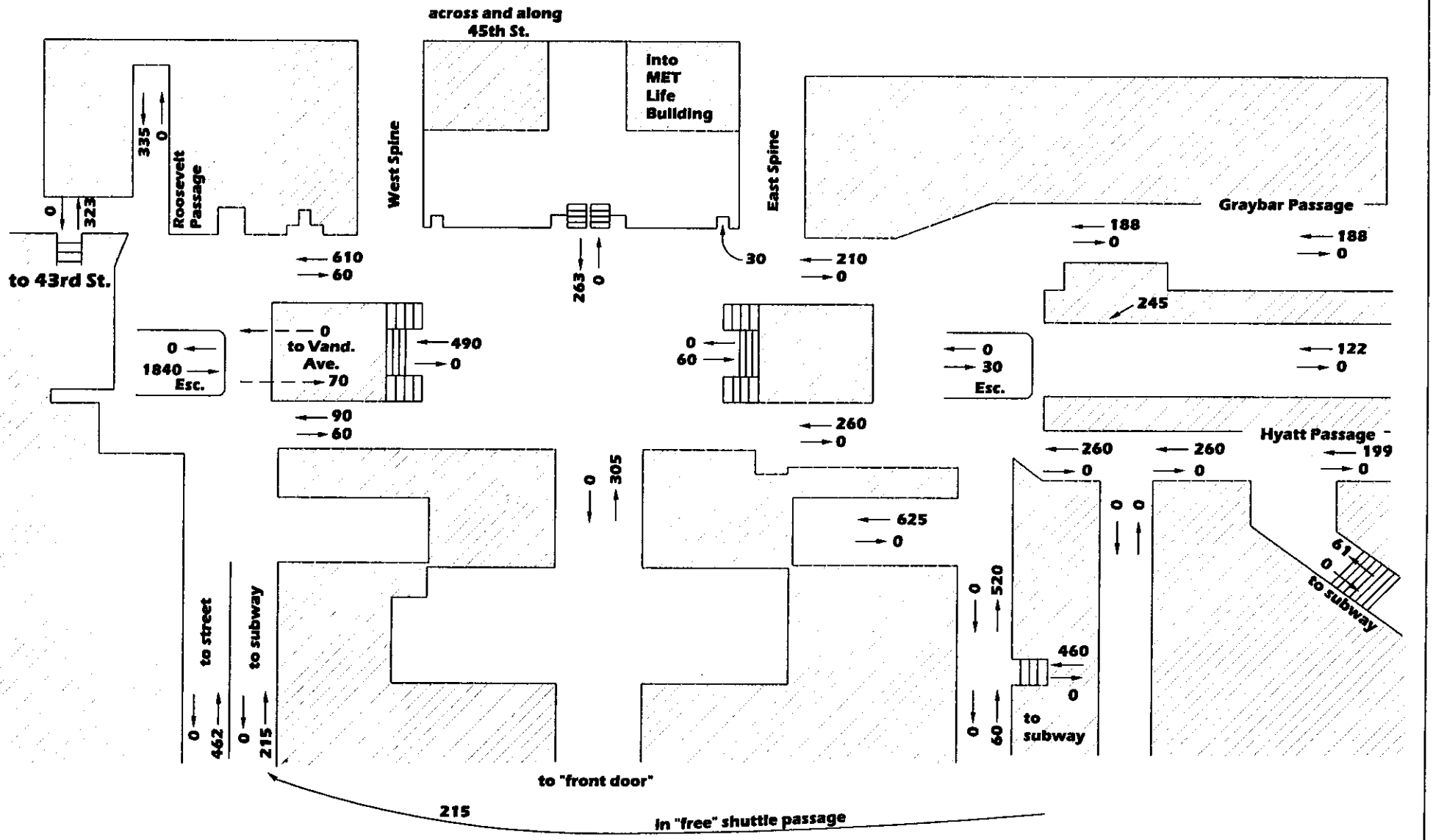


GCT UPPER CONCOURSE

2010 Future Build Increment
Pedestrian Flows
AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

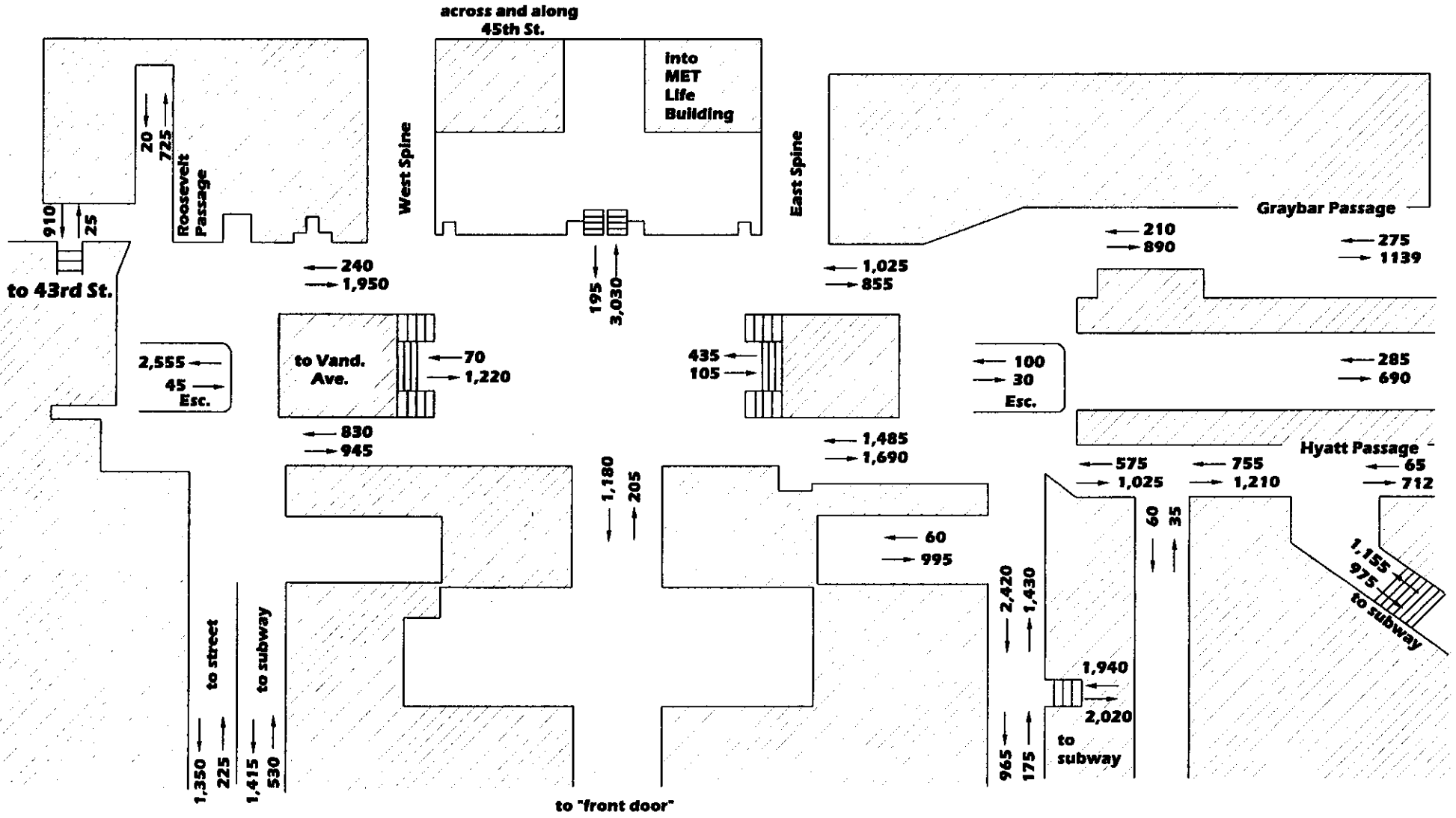
2010 Future Build Increment

Pedestrian Flows

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



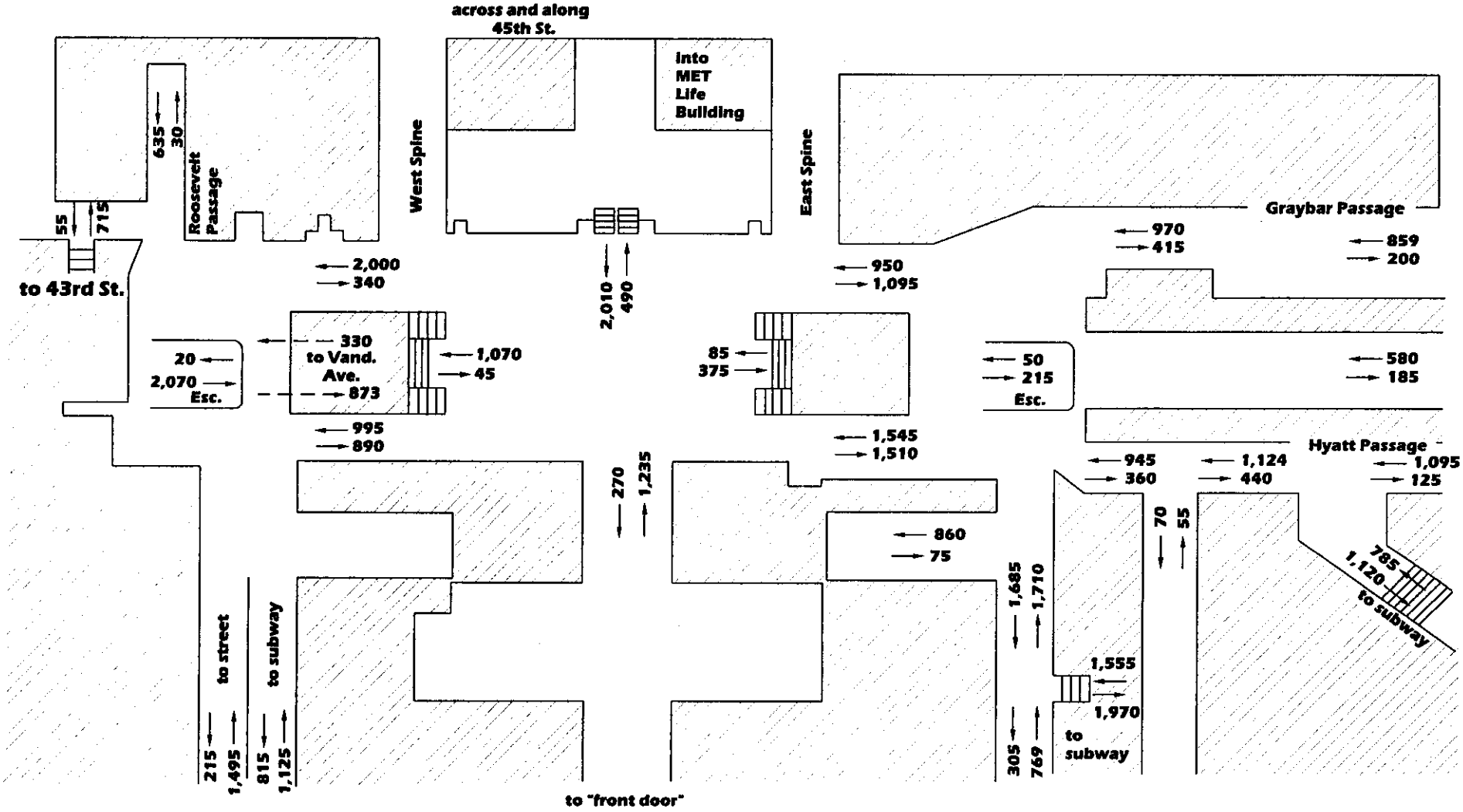
GCT UPPER CONCOURSE

2020 Future Build Conditions

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



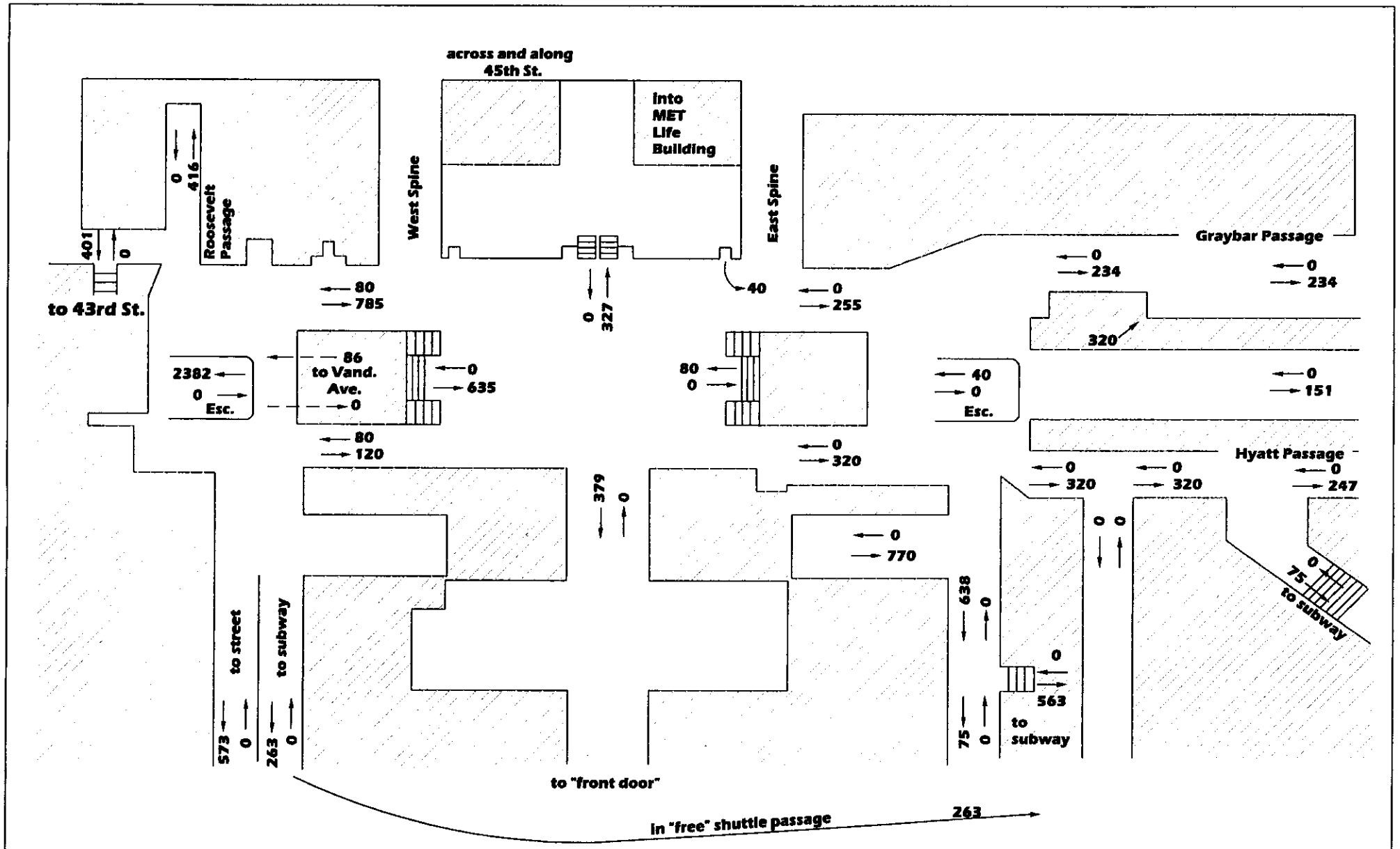
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2020 Future Build Conditions

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

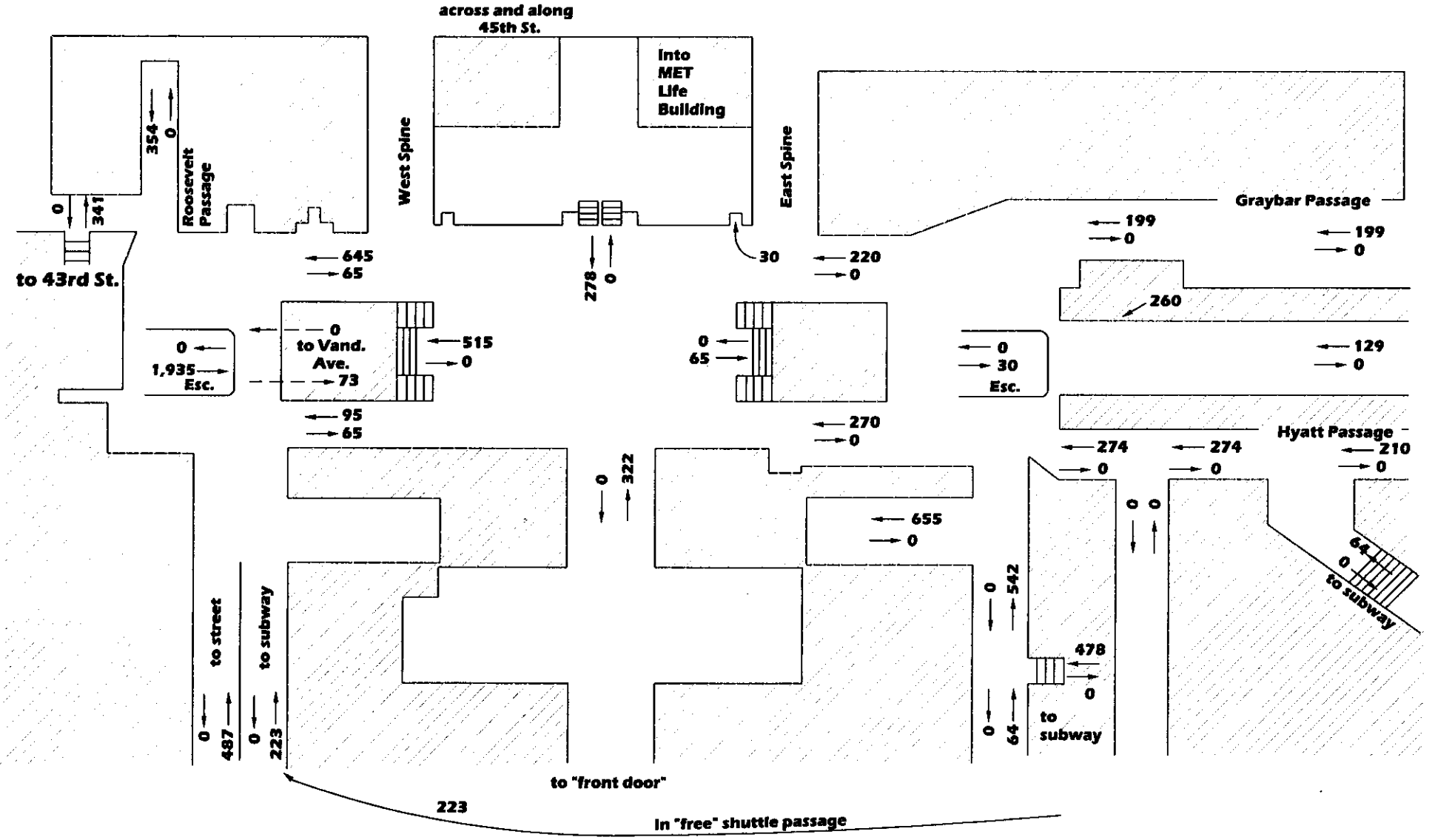
2020 Future Build Increment

Pedestrian Flows

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



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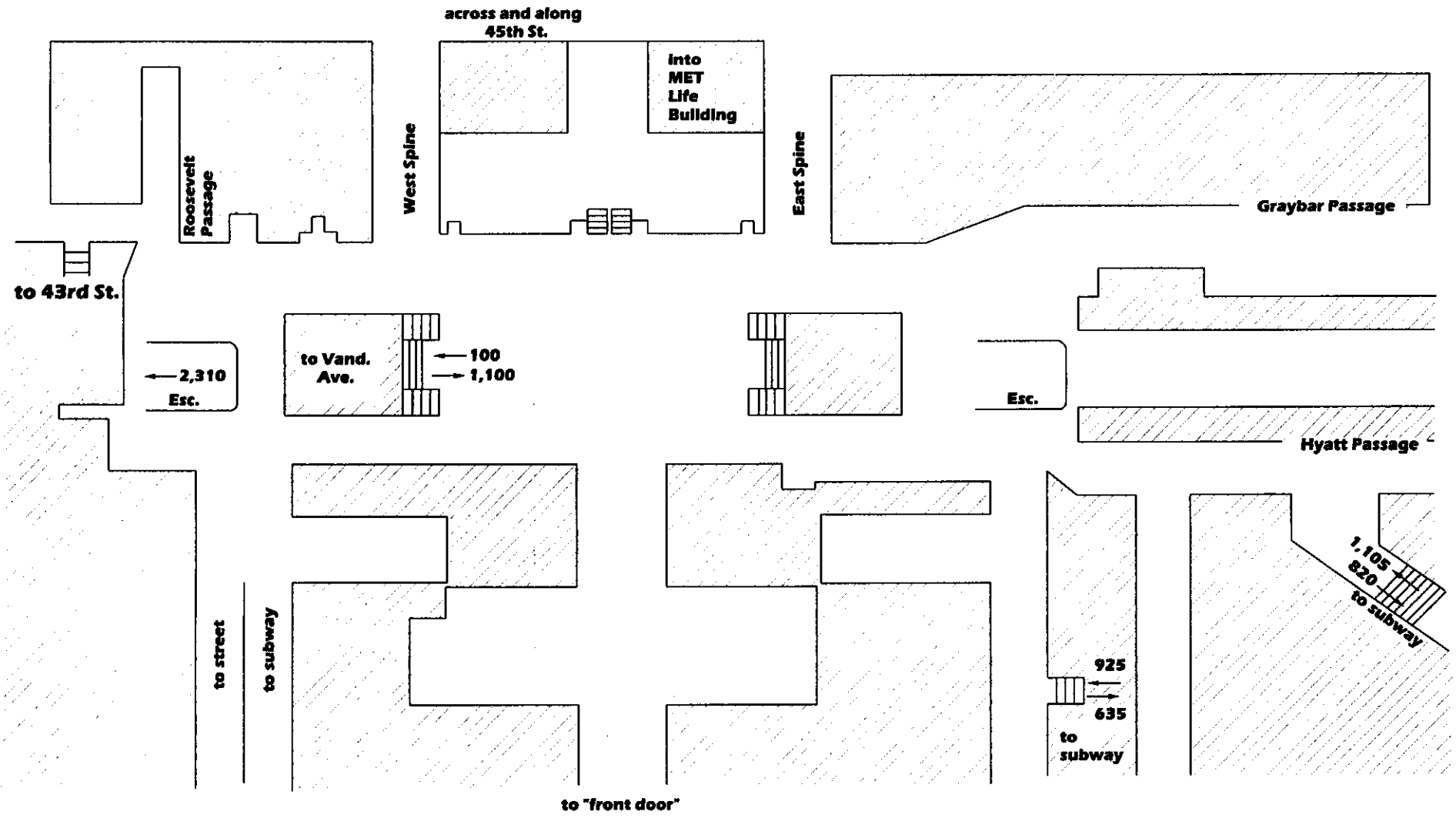
2020 Future Build Increment

Pedestrian Flows

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



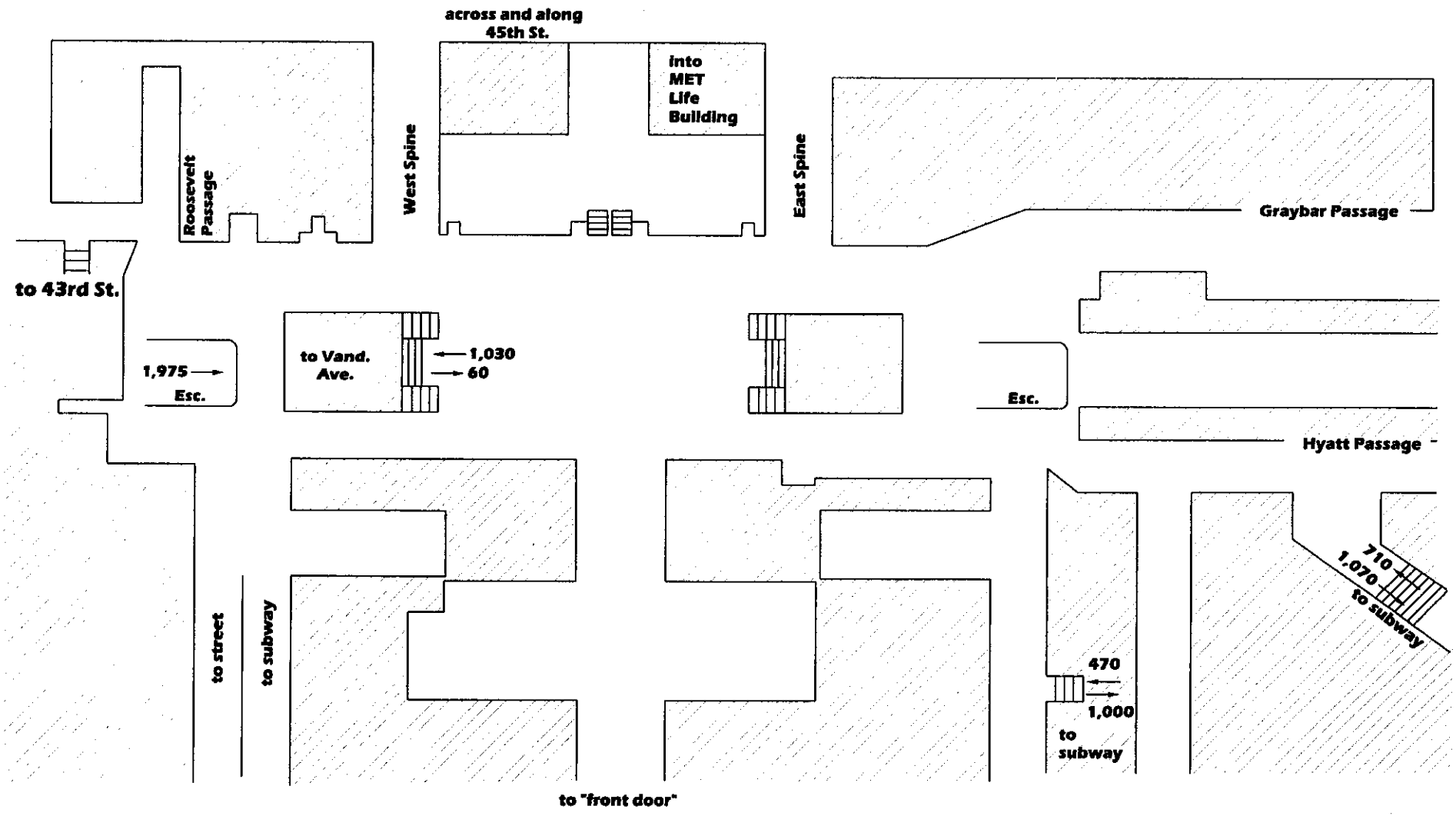
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2010 Mitigated Build Conditions

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



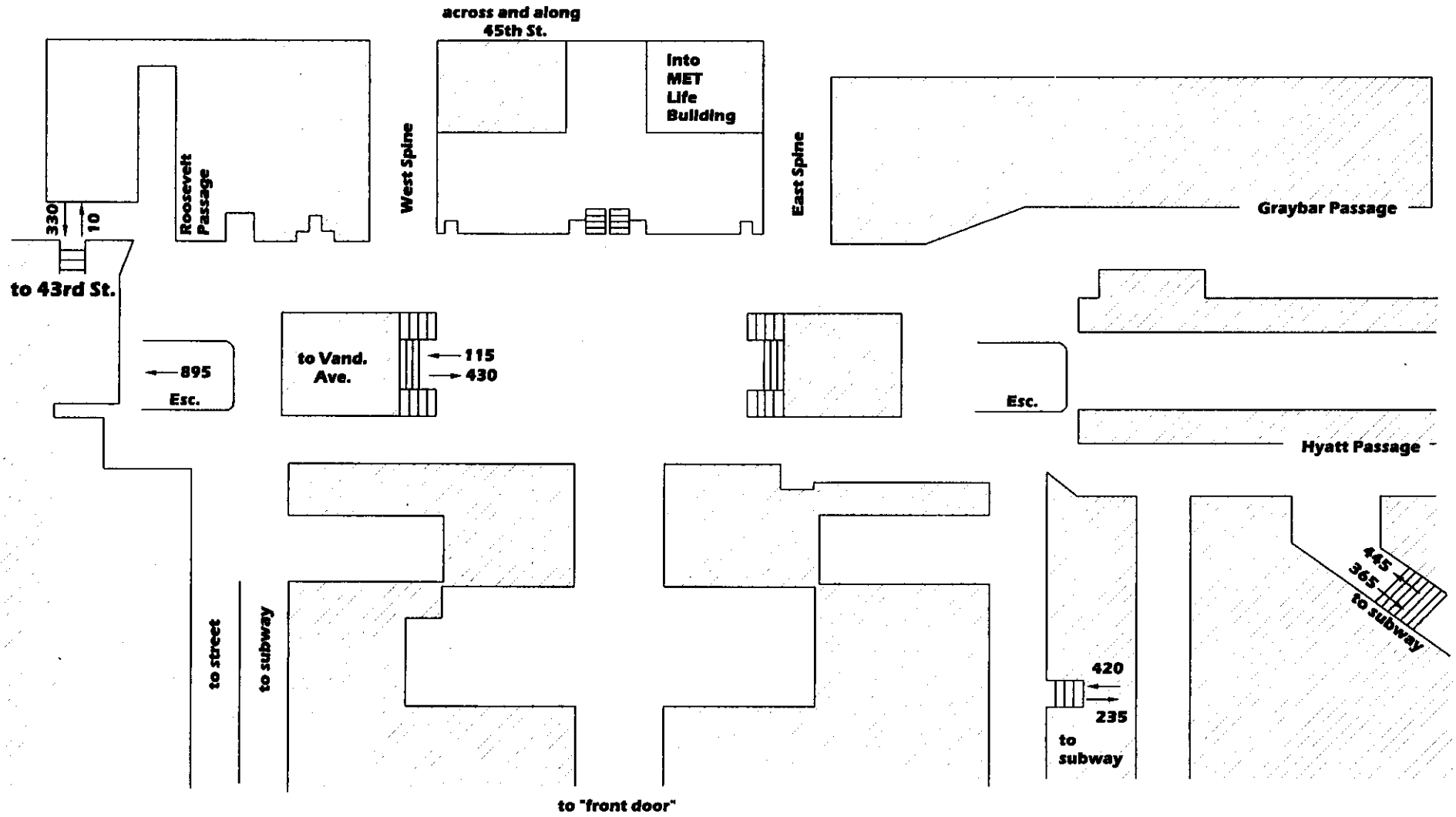
GCT UPPER CONCOURSE

2010 Mitigated Build Conditions

PM Peak 15 minutes

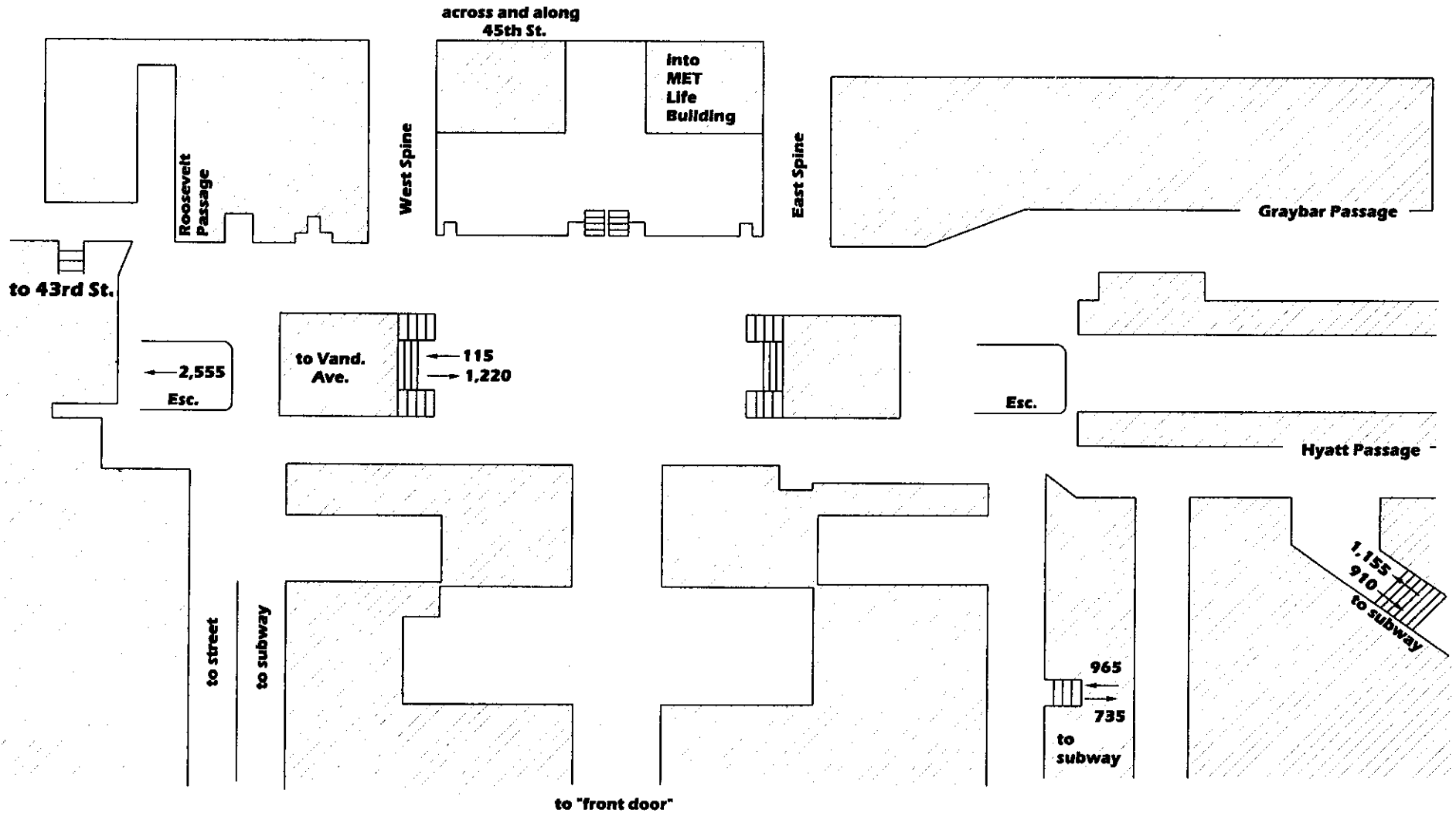
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



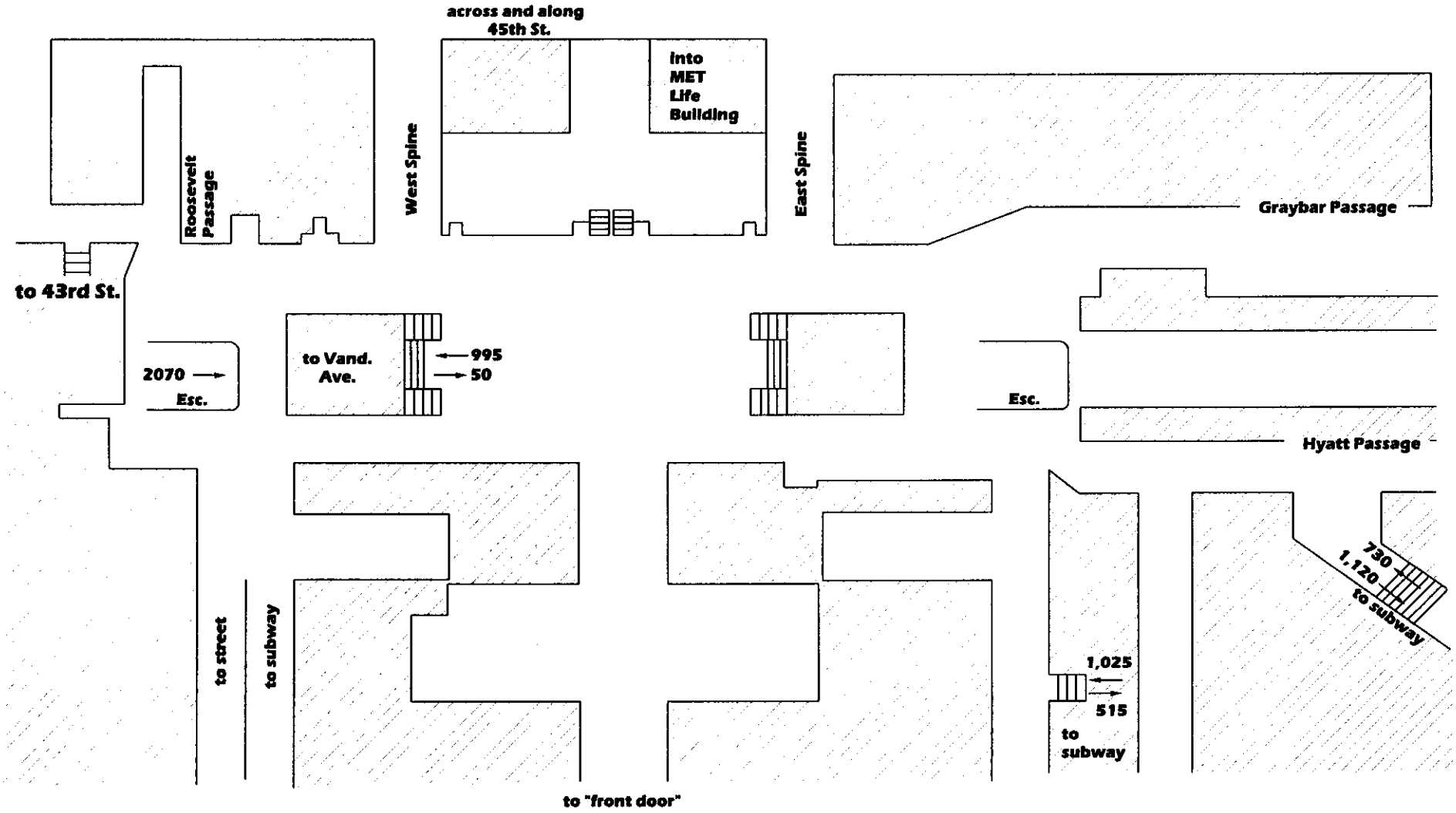
GCT UPPER CONCOURSE
2020 Mitigated Build Conditions
AM Peak 5 minutes

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



GCT UPPER CONCOURSE
2020 Mitigated Build Conditions
AM Peak 15 minutes

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



GCT UPPER CONCOURSE

2020 Mitigated Build Conditions

PM Peak 15 minutes

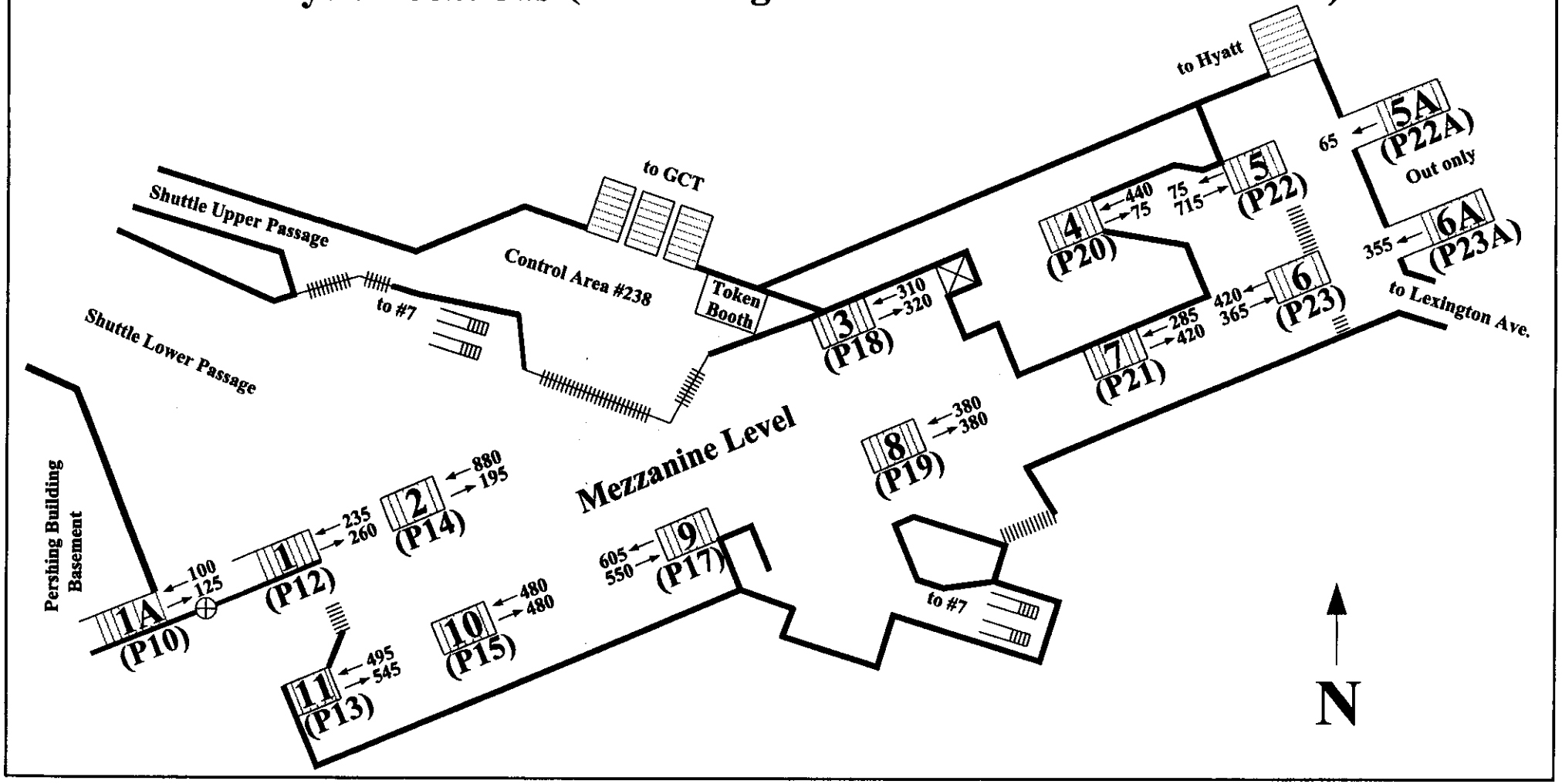
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

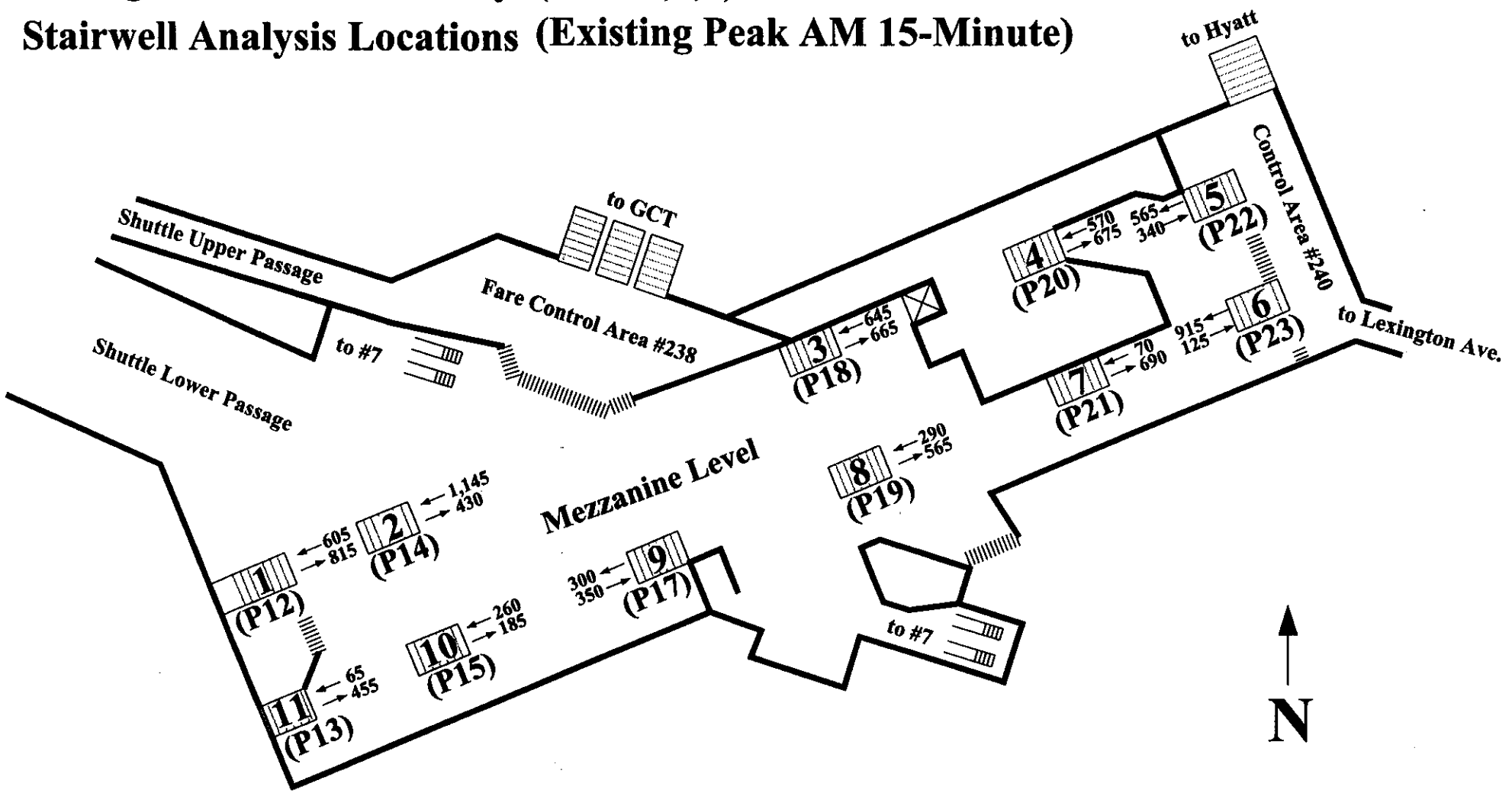
FIGURE M-8

LEXINGTON AVENUE SUBWAY STAIRWELL VOLUMES

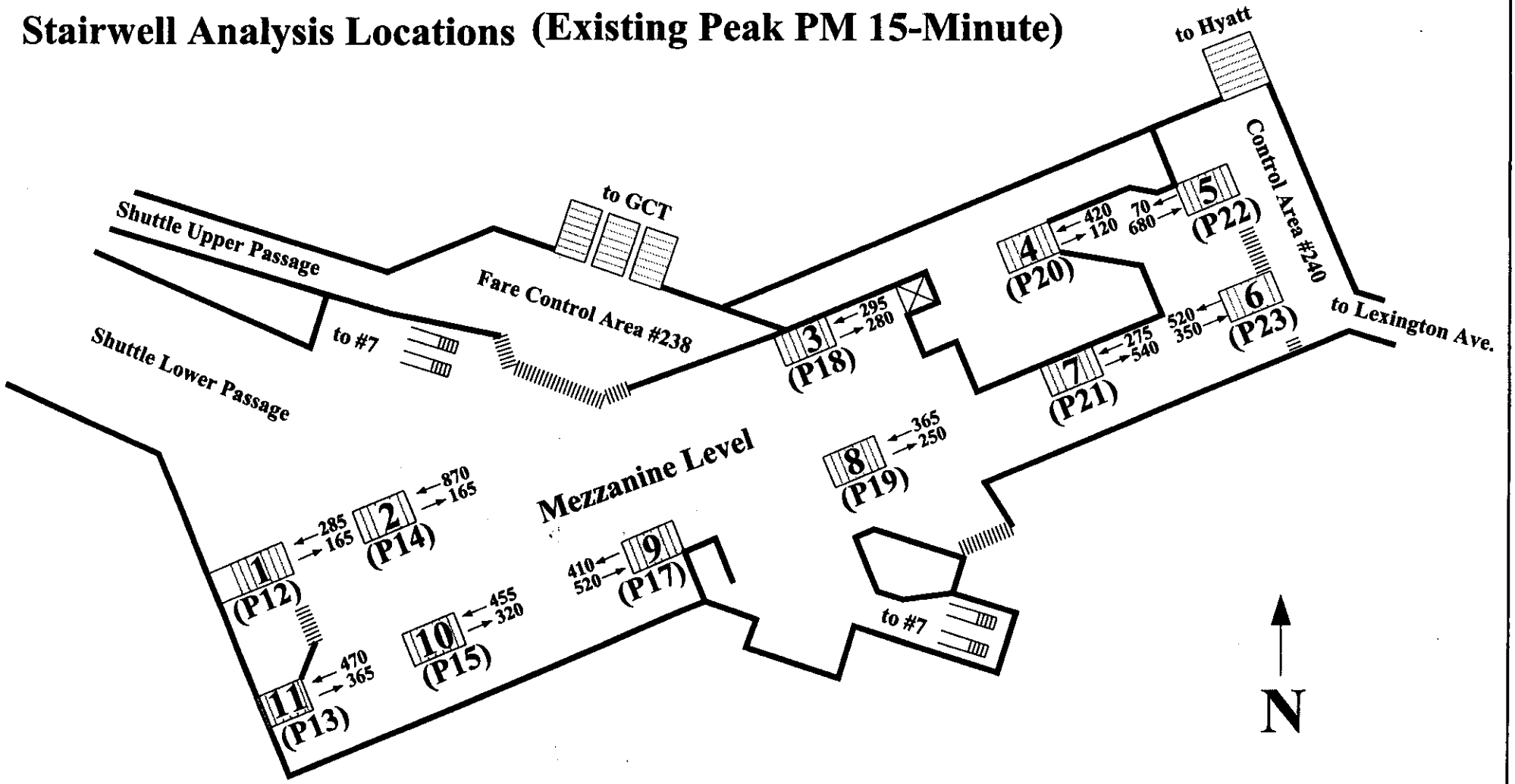
Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations (2010 Mitigated Build Peak PM 15-Minute)



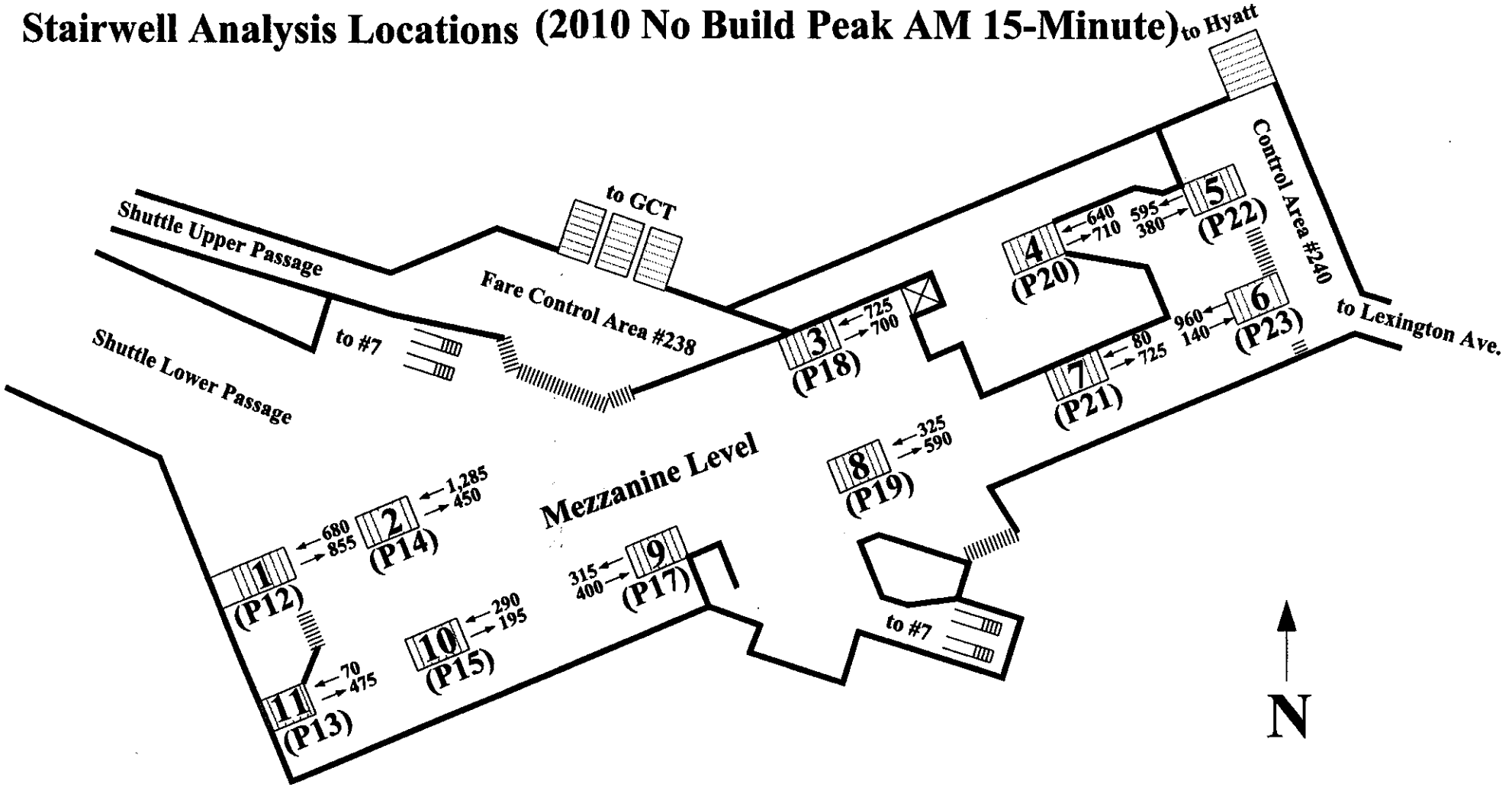
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (Existing Peak AM 15-Minute)



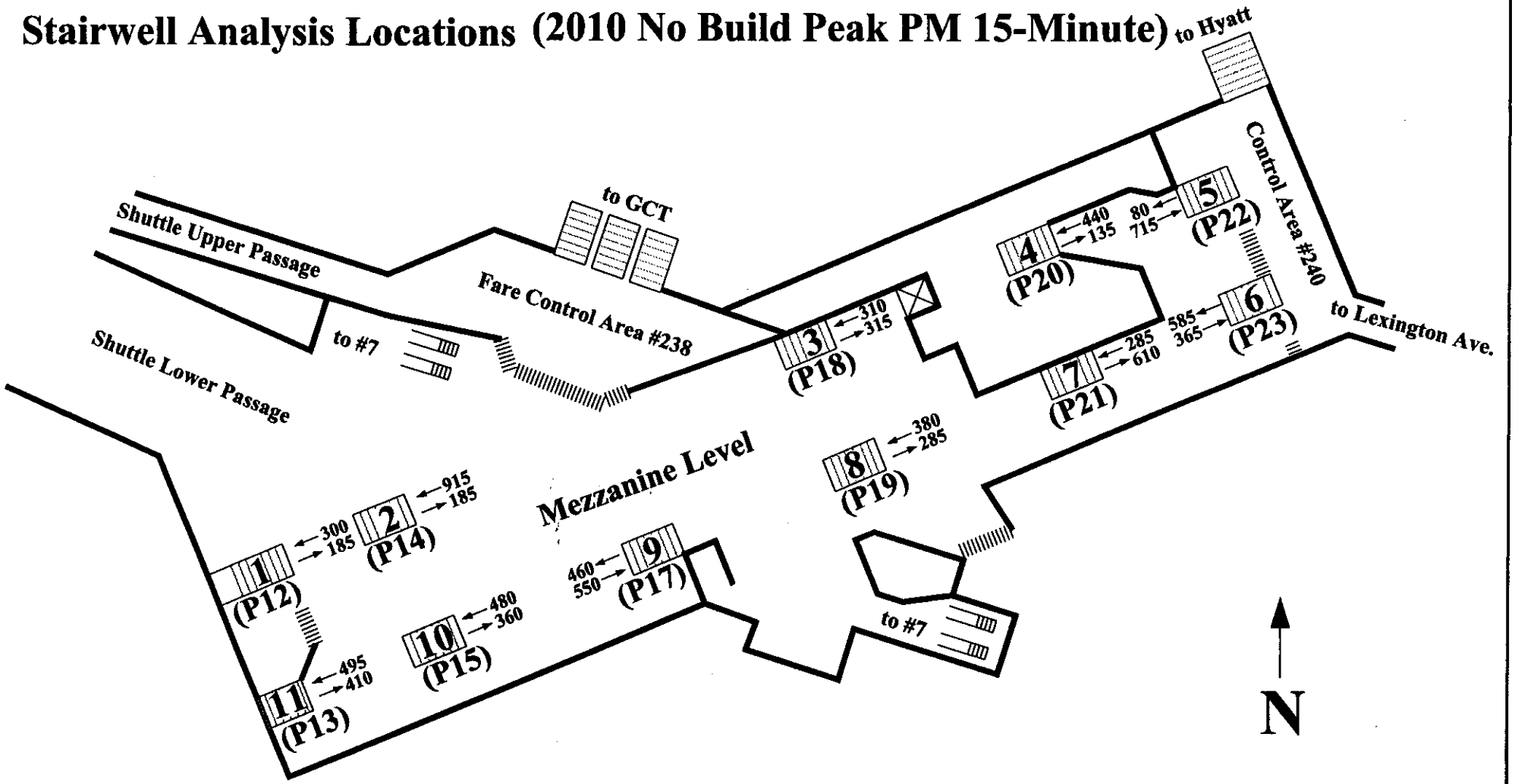
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (Existing Peak PM 15-Minute)



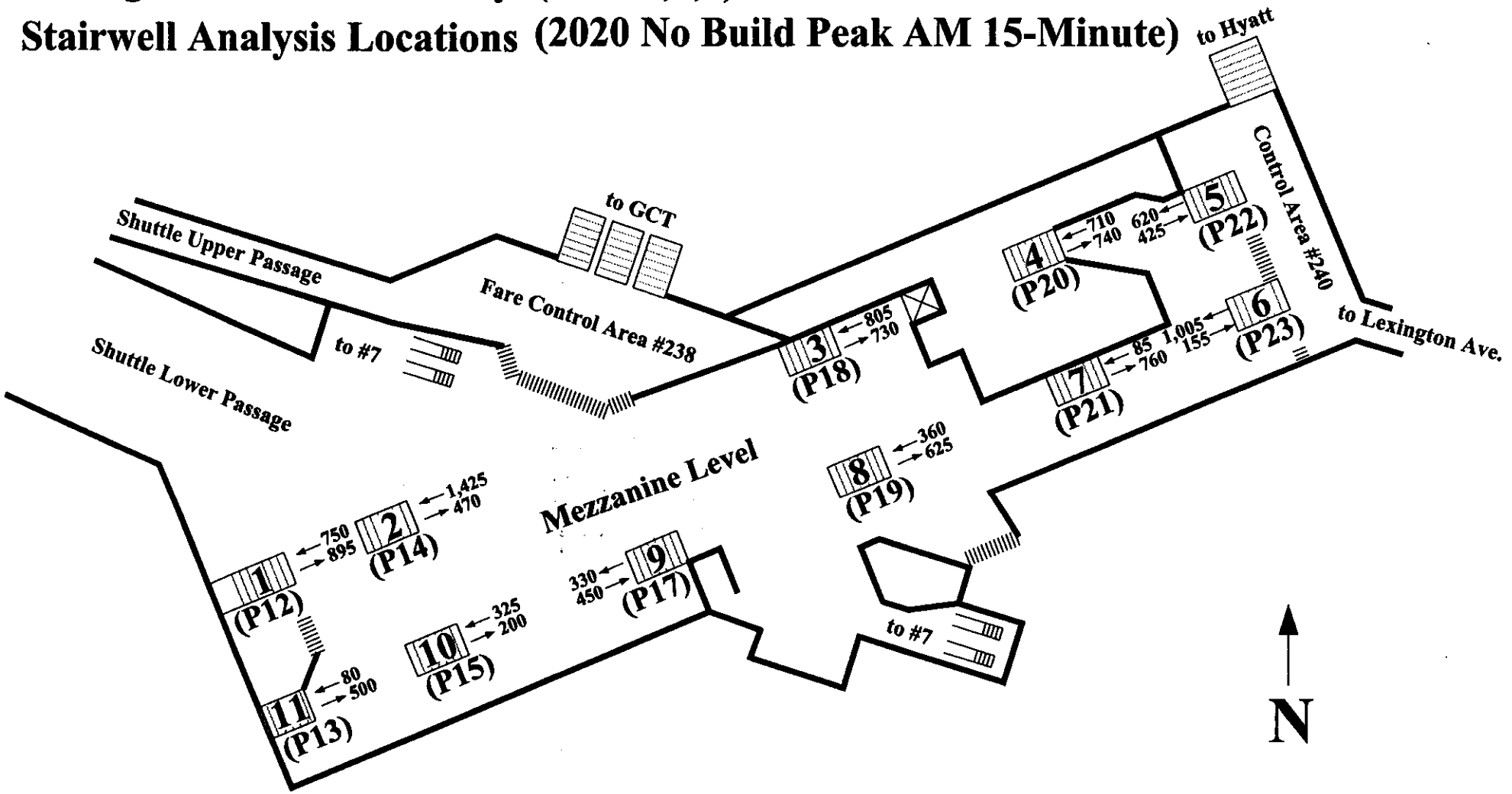
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 No Build Peak AM 15-Minute)



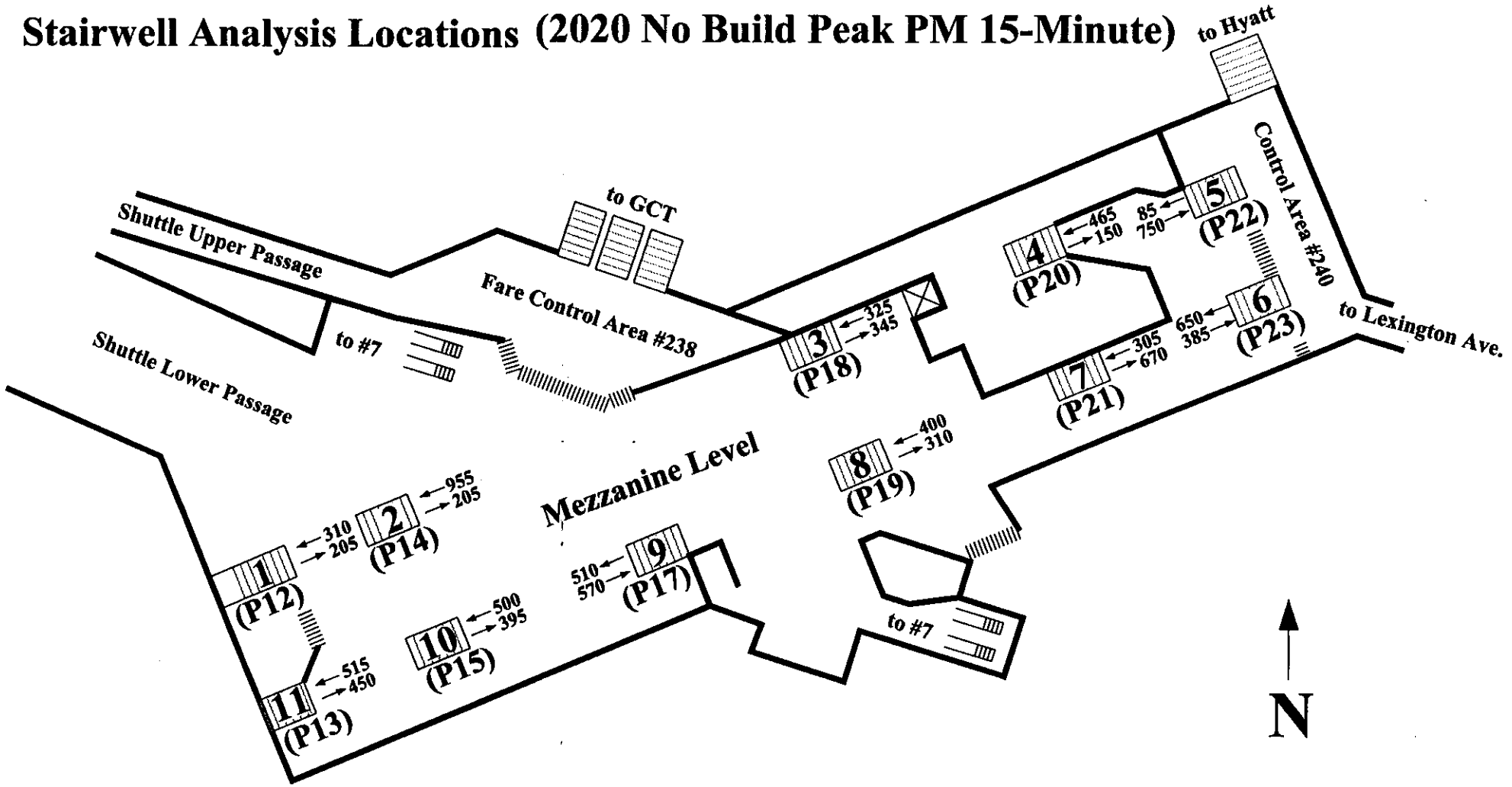
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 No Build Peak PM 15-Minute)



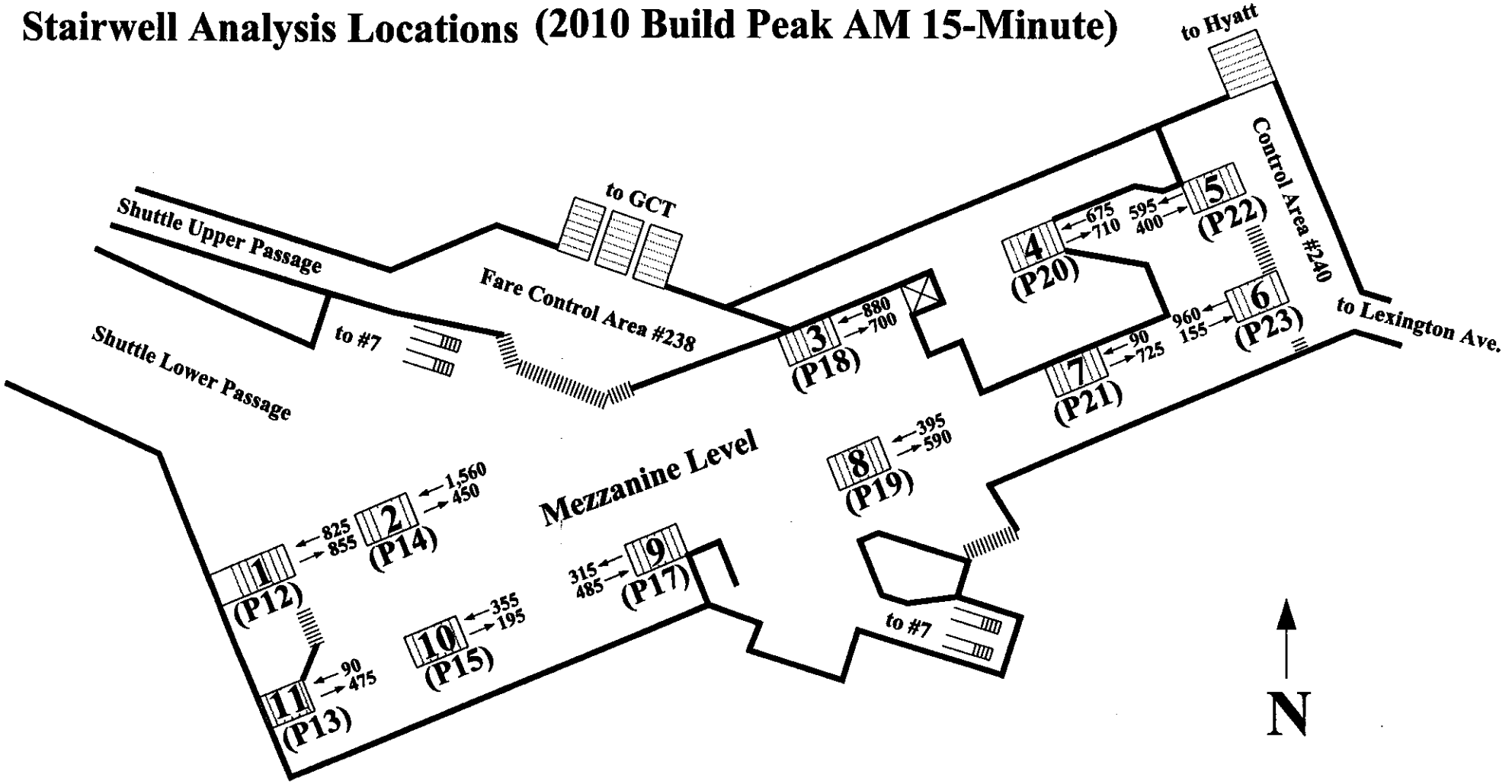
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 No Build Peak AM 15-Minute)



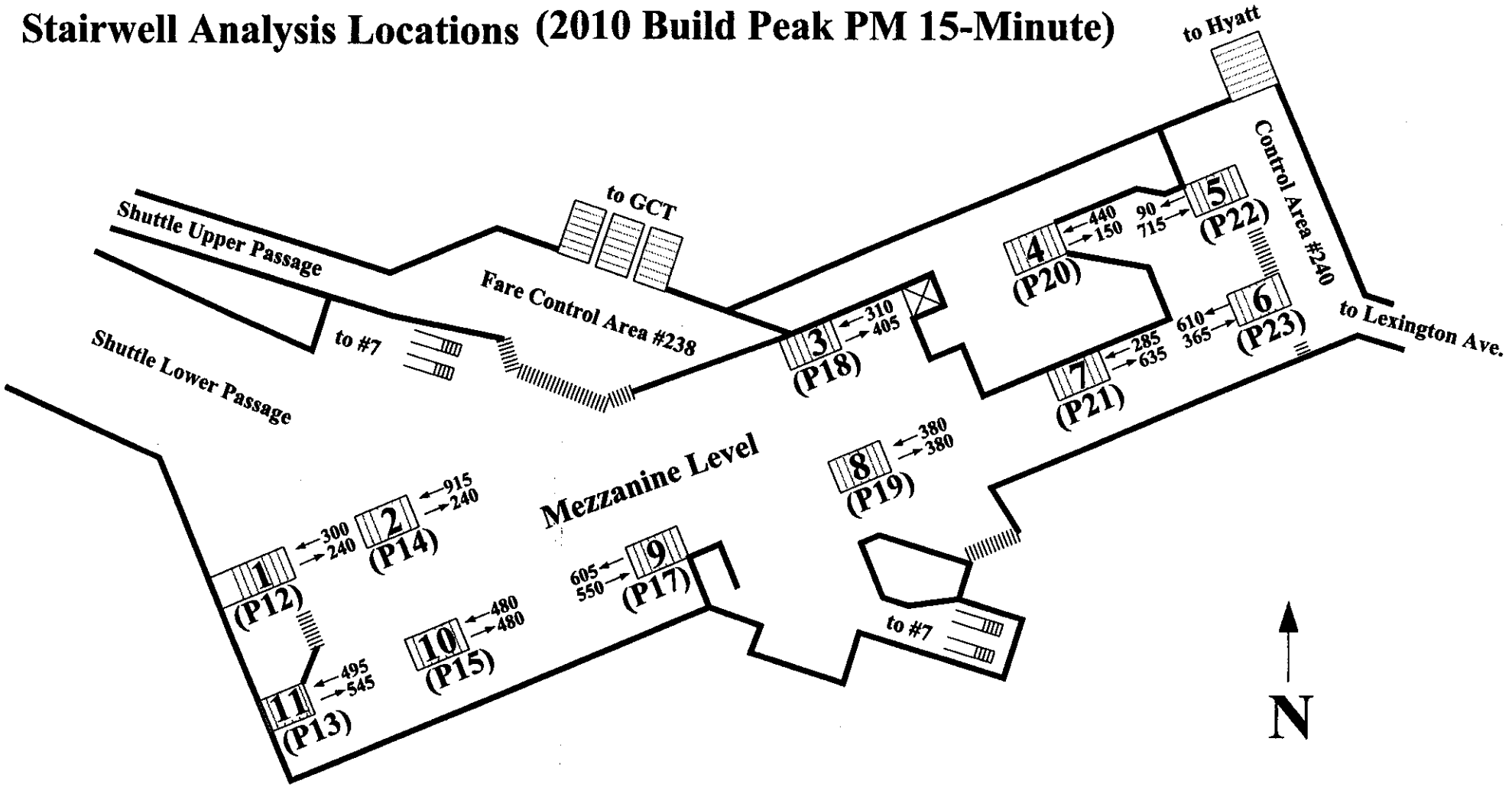
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 No Build Peak PM 15-Minute)



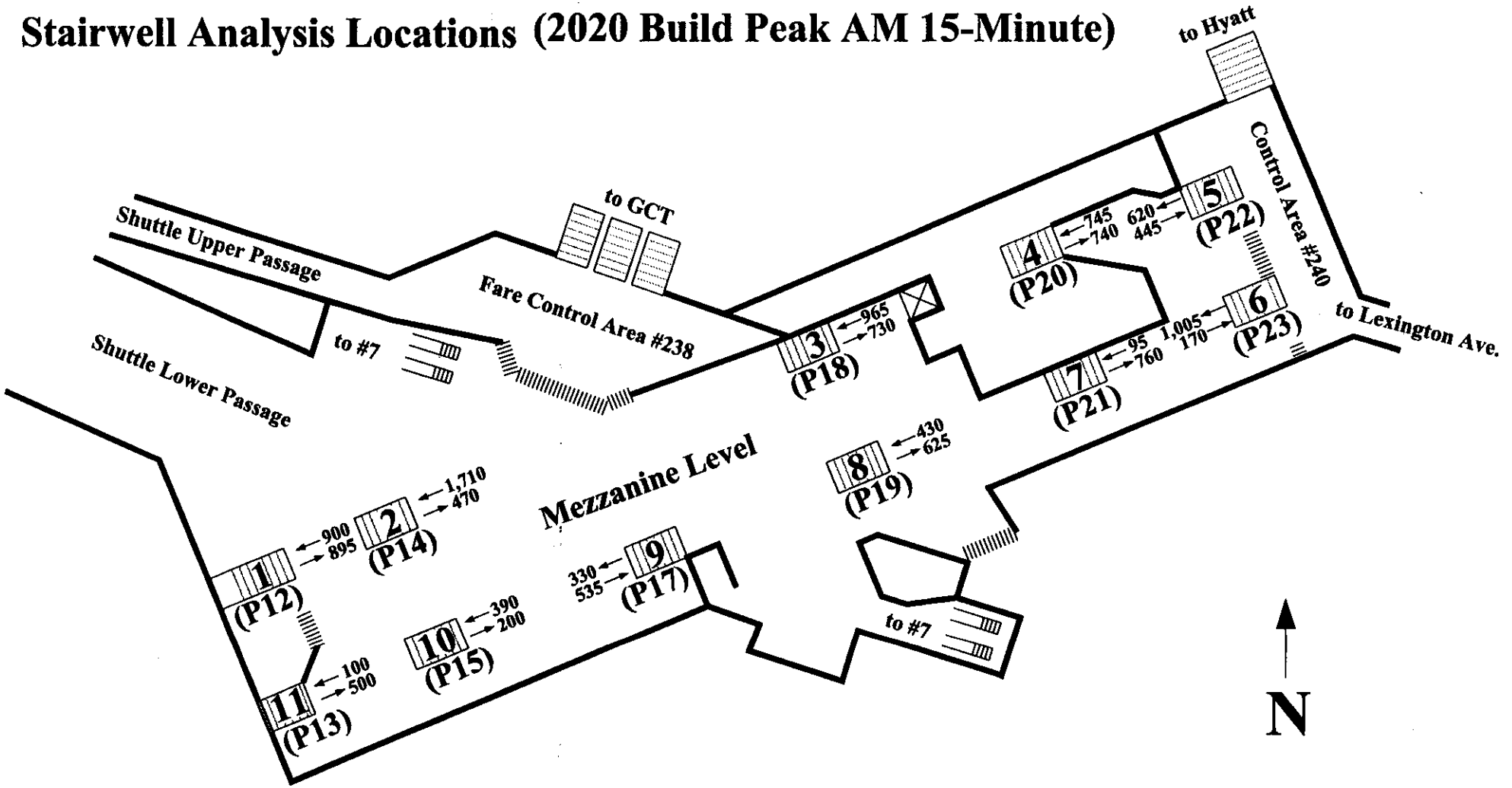
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 Build Peak AM 15-Minute)



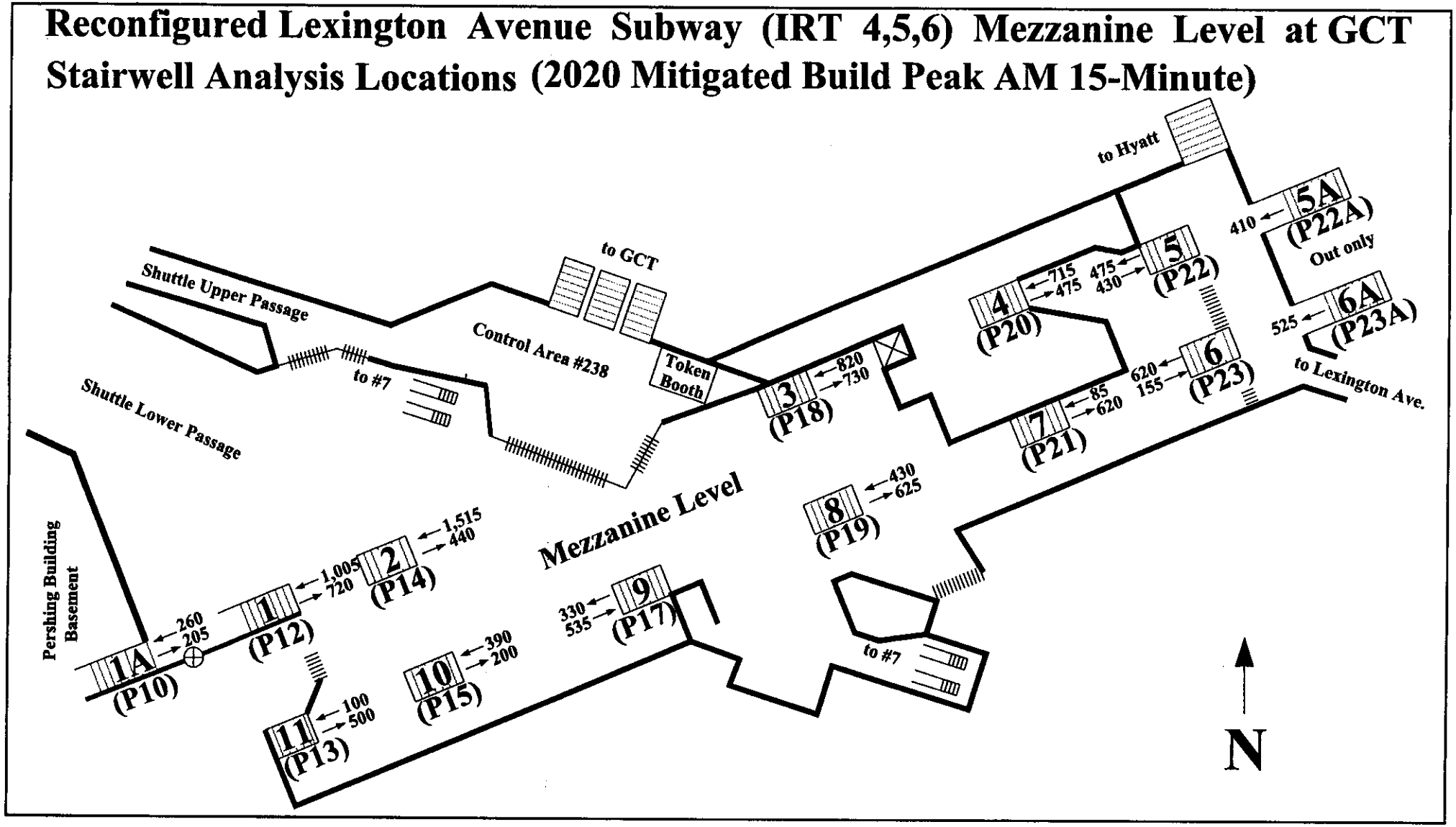
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 Build Peak PM 15-Minute)



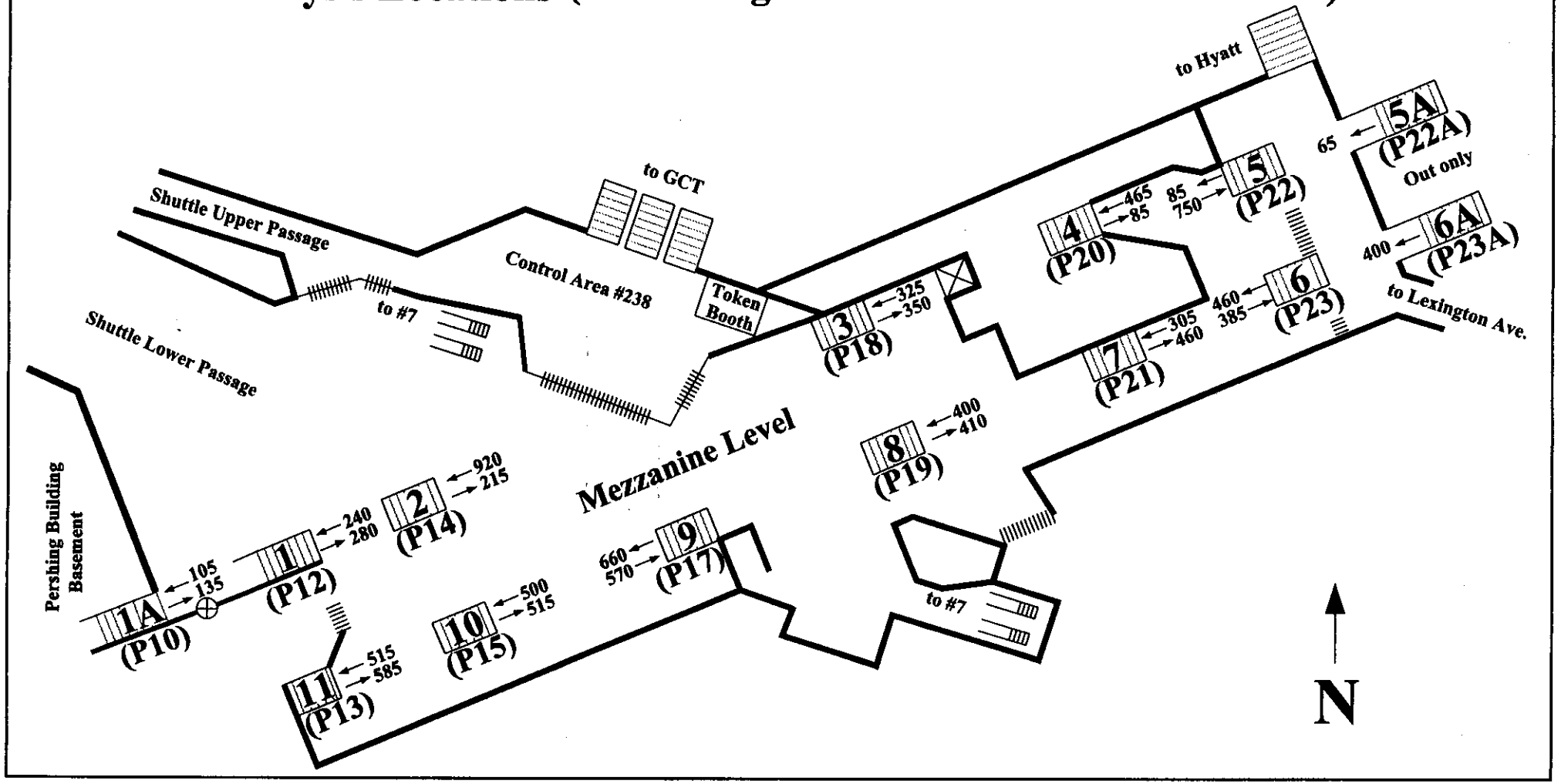
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 Build Peak AM 15-Minute)



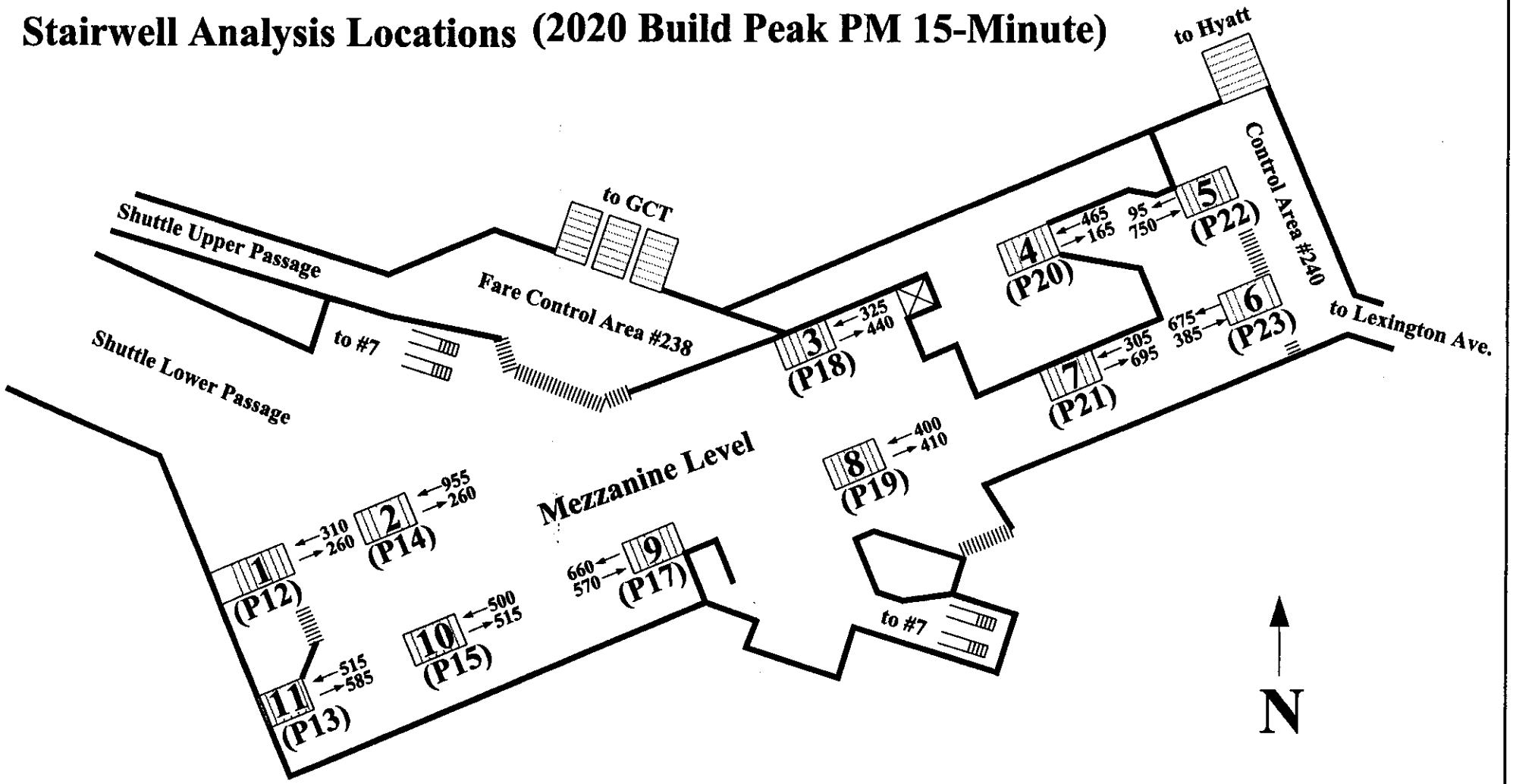
Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 Mitigated Build Peak AM 15-Minute)



Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations (2020 Mitigated Build Peak PM 15-Minute)



Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 Build Peak PM 15-Minute)



Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations (2010 Mitigated Build Peak AM 15-Minute)

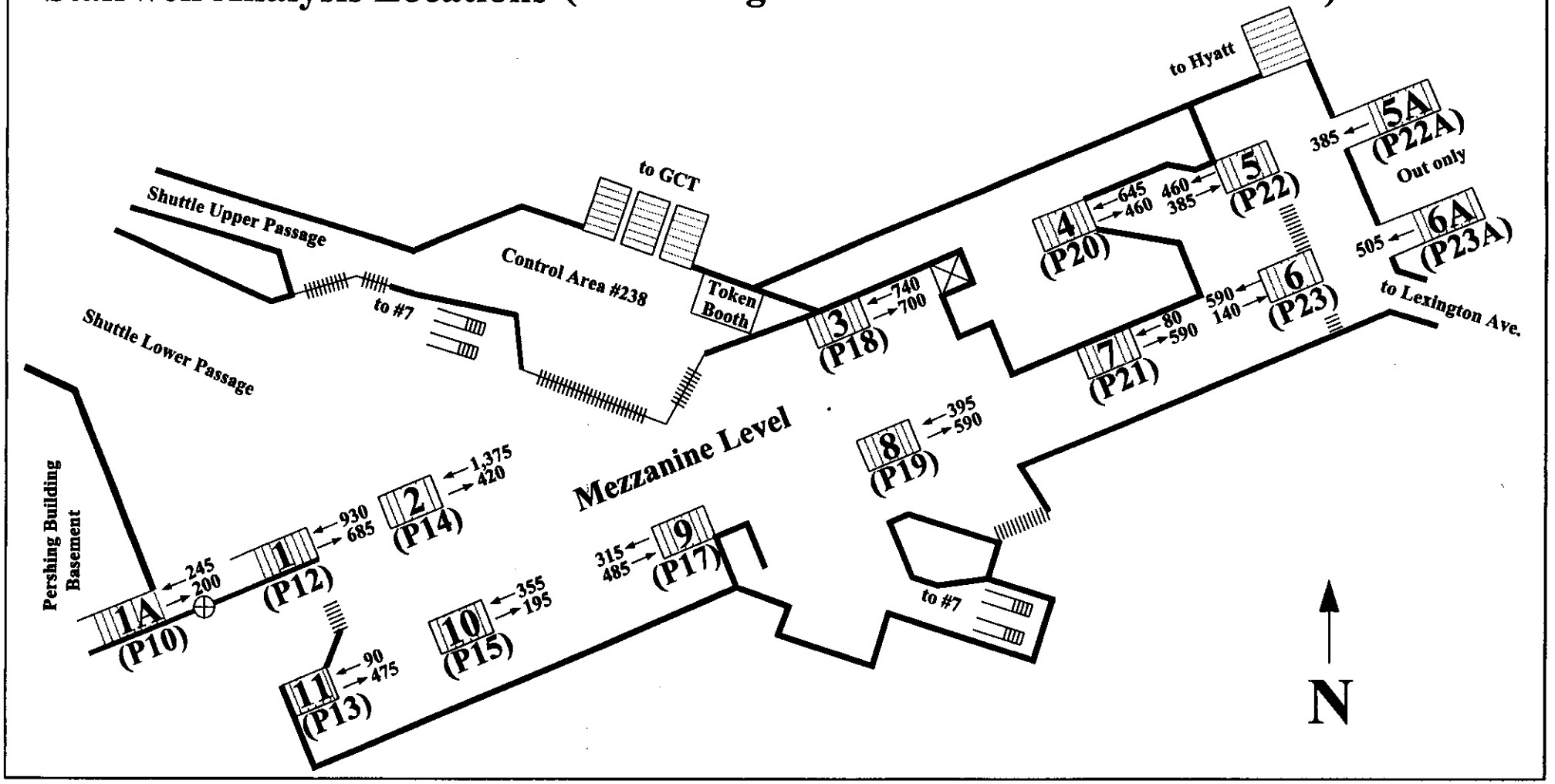


TABLE M-1

EXISTING
LIRR / GCT TRAFFIC
LEVELS OF SERVICE

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(1) SEVENTH AVENUE & 42nd STREET													
Seventh Avenue	SB	LTR	0.99	28.8	D	LTR	0.60	11.3	B	LTR	0.73	12.8	B
42nd Street	EB	TR	0.74	20.1	C	TR	0.75	19.8	C	TR	0.65	17.9	C
42nd Street	WB	LT	0.56	16.6	C	LT	0.50	15.7	C	LT	0.72	19.4	C
Overall Intersection		-	**0.88**	**25.4**	**D**	-	**0.67**	**14.3**	**B**	-	**0.72**	**14.9**	**B**
(2) BROADWAY & 42nd STREET													
Broadway	SB	LTR	0.69	13.3	B	LTR	0.55	11.6	B	LTR	0.58	12.0	B
42nd Street	EB	TR	0.51	14.9	B	TR	0.60	16.0	C	TR	0.48	14.6	B
42nd Street	WB	L	0.98	63.8	F	LT	0.92	31.9	D	LT	1.01	48.7	E
		T	1.00	52.3	E	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.83**	**24.4**	**C**	-	**0.72**	**17.9**	**C**	-	**0.78**	**23.8**	**C**
(3) SIXTH AVENUE & 42nd STREET													
Sixth Avenue	NB	LT	0.99	26.5	D	LT	0.81	14.7	B	LTR	0.97	24.1	C
		R	0.67	16.7	C	R	0.30	9.5	B	R	0.55	12.9	B
42nd Street	EB	LT	0.74	19.2	C	LT	0.70	18.3	C	LT	0.67	17.5	C
42nd Street	WB	TR	0.72	18.5	C	TR	0.61	16.5	C	TR	0.63	16.9	C
		R	1.02	81.2	F	R	1.00	69.0	F	R	1.02	76.7	F
Overall Intersection		-	**1.00**	**25.9**	**D**		**0.89**	**18.2**	**C**	-	**0.99**	**24.0**	**C**
(4) FIFTH AVENUE & 48th STREET													
Fifth Avenue	SB	LT	0.75	9.9	B	LT	0.80	13.6	B	LT	0.67	9.1	B
48th Street	EB	TR	0.49	15.2	C	TR	0.54	13.4	B	TR	0.76	19.7	C
Overall Intersection		-	**0.63**	**10.9**	**B**	-	**0.67**	**13.5**	**B**	-	**0.71**	**12.2**	**B**
(5) FIFTH AVENUE & 47th STREET													
Fifth Avenue	SB	TR	0.65	8.8	B	TR	0.75	12.8	B	TR	0.64	8.9	B
47th Street	WB	LT	0.67	17.5	C	LT	0.59	14.0	B	LT	0.51	15.4	C
Overall Intersection		-	**0.66**	**11.2**	**B**	-	**0.67**	**13.1**	**B**	-	**0.59**	**10.2**	**B**
(6) FIFTH AVENUE & 46th STREET													
Fifth Avenue	SB	LT	0.67	9.1	B	LT	0.81	13.8	B	LT	0.67	9.1	B
46th Street	EB	TR	0.48	15.1	C	TR	0.49	12.9	B	TR	0.61	16.6	C
Overall Intersection		-	**0.59**	**10.4**	**B**	-	**0.65**	**13.6**	**B**	-	**0.64**	**10.9**	**B**
(7) FIFTH AVENUE & 45th STREET													
Fifth Avenue	SB	TR	0.74	9.9	B	TR	0.81	13.8	B	TR	0.68	9.3	B
45th Street	WB	LT	0.55	15.8	C	LT	0.96	43.1	E	LT	0.51	15.4	C
Overall Intersection		-	**0.66**	**11.3**	**B**	-	**0.89**	**18.5**	**C**	-	**0.61**	**10.6**	**B**
(8) FIFTH AVENUE & 44th STREET													
Fifth Avenue	SB	LT	0.72	9.6	B	LT	0.78	13.3	B	LT	0.68	9.2	B
44th Street	EB	TR	0.57	16.1	C	TR	0.45	12.6	B	TR	0.60	16.6	C
Overall Intersection		-	**0.65**	**11.0**	**B**	-	**0.62**	**13.2**	**B**	-	**0.64**	**10.8**	**B**
(9) FIFTH AVENUE & 43rd STREET													
Fifth Avenue	SB	TR	0.74	9.8	B	TR	0.82	14.1	B	TR	0.72	9.6	B
43rd Street	WB	LT	0.48	15.1	C	LT	1.03	58.4	E	LT	0.46	14.9	B
Overall Intersection		-	**0.63**	**10.8**	**B**		**0.93**	**21.9**	**C**	-	**0.60**	**10.6**	**B**
(10) FIFTH AVENUE & 42nd STREET													
Fifth Avenue	SB	LTR	0.66	12.3	B	LTR	0.67	12.4	B	LTR	0.63	12.0	B
42nd Street	EB	TR	0.85	23.2	C	TR	0.80	20.9	C	TR	0.81	21.5	C
42nd Street	WB	LT	0.98	39.5	D	LT	0.91	28.3	D	LT	0.96	34.4	D
Overall Intersection		-	**0.80**	**21.3**	**C**	-	**0.78**	**18.0**	**C**	-	**0.78**	**19.6**	**C**

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(11) FIFTH AVENUE & 41st STREET													
Fifth Avenue	SB	LT	0.65	5.9	B	LT	0.63	5.7	B	LT	0.64	5.8	B
Overall Intersection		-	**0.40**	**5.9**	**B**	-	**0.38**	**5.7**	**B**	-	**0.39**	**5.8**	**B**
(12) FIFTH AVENUE & 40th STREET													
Fifth Avenue	SB	LT	0.68	9.2	B	LT	0.64	8.8	B	LT	0.65	8.9	B
40th Street	EB	TR	0.55	15.8	C	TR	0.52	15.5	C	TR	0.67	17.7	C
Overall Intersection		-	**0.62**	**10.8**	**B**	-	**0.59**	**10.2**	**B**	-	**0.66**	**11.3**	**B**
(13) MADISON AVENUE & 40th STREET													
Madison Avenue	NB	TR	0.80	11.2	B	TR	0.90	17.2	C	TR	0.84	12.0	B
40th Street	EB	LT	0.65	17.4	C	LT	0.44	12.4	B	LT	0.53	15.6	C
Overall Intersection		-	**0.73**	**13.0**	**B**	-	**0.67**	**16.2**	**C**	-	**0.70**	**12.9**	**B**
(14) MADISON AVENUE & 41st STREET													
Madison Avenue	NB	TR	0.84	12.0	B	TR	0.89	16.8	C	TR	0.81	11.2	B
41st Street	EB	LT	0.71	23.0	C	LT	0.54	14.3	B	LT	0.48	15.4	C
Overall Intersection		-	**0.78**	**13.1**	**B**	-	**0.72**	**16.6**	**C**	-	**0.66**	**11.7**	**B**
(15) MADISON AVENUE & 42nd STREET													
Madison Avenue	NB	LTR	0.83	16.2	C	LTR	0.88	20.3	C	LTR	0.80	15.1	C
42nd Street	EB	LT	1.00	43.3	E	LT	1.00	48.0	E	LT	0.87	24.7	C
42nd Street	WB	T	0.86	24.2	C	T	0.70	15.9	C	TR	0.81	21.3	C
Overall Intersection		-	**0.91**	**25.2**	**D**	-	**0.79**	**25.7**	**D**	-	**0.83**	**19.1**	**C**
(16) MADISON AVENUE & 43rd STREET													
Madison Avenue	NB	LT	0.56	8.3	B	LT	0.62	11.4	B	LT	0.55	8.1	B
43rd Street	WB	TR	0.52	15.5	C	TR	0.39	12.0	B	TR	0.42	14.5	B
Overall Intersection		-	**0.54**	**10.0**	**B**	-	**0.51**	**11.5**	**B**	-	**0.49**	**9.5**	**B**
(17) MADISON AVENUE & 44th STREET													
Madison Avenue	NB	TR	0.54	8.1	B	TR	0.55	10.8	B	TR	0.49	7.8	B
44th Street	EB	LT	0.90	31.6	D	LT	0.68	16.6	C	LT	0.58	16.4	C
Overall Intersection		-	**0.70**	**14.1**	**B**	-	**0.62**	**12.0**	**B**	-	**0.53**	**9.8**	**B**
(18) MADISON AVENUE & 45th STREET													
Madison Avenue	NB	LT	0.63	8.8	B	LT	0.65	11.7	B	LT	0.60	8.5	B
45th Street	WB	TR	0.66	17.4	C	TR	0.93	36.4	D	TR	0.52	15.5	C
Overall Intersection		-	**0.64**	**11.2**	**B**	-	**0.79**	**16.4**	**C**	-	**0.57**	**10.2**	**B**
(19) MADISON AVENUE & 46th STREET													
Madison Avenue	NB	TR	0.58	8.4	B	TR	0.65	11.7	B	TR	0.59	8.5	B
46th Street	EB	LT	0.63	16.8	C	LT	0.92	32.3	D	LT	0.65	17.4	C
Overall Intersection		-	**0.60**	**10.7**	**B**	-	**0.78**	**16.2**	**C**	-	**0.62**	**11.0**	**B**
(20) MADISON AVENUE & 47th STREET													
Madison Avenue	NB	LT	0.62	8.7	B	LT	0.63	11.5	B	LT	0.53	8.0	B
47th Street	WB	TR	0.68	17.6	C	TR	0.54	13.4	B	TR	0.53	15.5	C
Overall Intersection		-	**0.65**	**11.5**	**B**	-	**0.59**	**12.0**	**B**	-	**0.53**	**10.1**	**B**
(21) MADISON AVENUE & 48th STREET													
Madison Avenue	NB	TR	0.65	8.9	B	TR	0.66	11.8	B	TR	0.54	8.1	B
48th Street	EB	LT	0.44	14.7	B	LT	0.53	13.3	B	LT	0.64	17.0	C
Overall Intersection		-	**0.56**	**10.2**	**B**	-	**0.60**	**12.2**	**B**	-	**0.59**	**10.8**	**B**

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(22) VANDERBILT AVENUE & 47th STREET													
Vanderbilt Avenue	NB	L	0.18	12.8	B	L	0.11	12.5	B	L	0.16	12.7	B
47th Street	WB	LT	0.81	16.3	C	LT	0.72	14.0	B	LT	0.58	11.7	B
Overall Intersection		-	**0.53**	**16.1**	**C**	-	**0.46**	**13.9**	**B**	-	**0.40**	**11.8**	**B**
(23) VANDERBILT AVENUE & 46th STREET													
Vanderbilt Avenue	NB	TR	0.44	12.8	B	TR	0.70	19.2	C	TR	0.40	12.2	B
Vanderbilt Avenue	SB	LT	0.38	12.0	B	LT	0.35	11.8	B	LT	0.30	11.4	B
46th Street	EB	LTR	0.54	13.4	B	LTR	0.41	12.1	B	LTR	0.52	13.1	B
Overall Intersection		-	**0.49**	**12.9**	**B**	-	**0.55**	**13.6**	**B**	-	**0.46**	**12.6**	**B**
(24) VANDERBILT AVENUE & 45th STREET													
Vanderbilt Avenue	NB	LT	0.89	35.5	D	LT	0.29	11.3	B	LT	0.35	11.7	B
Vanderbilt Avenue	SB	TR	0.73	18.1	C	TR	0.50	13.2	B	TR	0.34	11.7	B
45th Street	WB	LTR	0.81	22.4	C	LTR	0.37	11.8	B	LTR	0.87	25.3	D
Overall Intersection		-	**0.85**	**24.1**	**C**	-	**0.43**	**12.1**	**B**	-	**0.61**	**19.0**	**C**
(27) VANDERBILT AVENUE & 42nd STREET													
42nd Street	EB	LT	0.83	20.0	C	LT	0.73	16.5	C	LT	0.81	19.1	C
42nd Street	WB	TR	0.86	20.9	C	TR	0.80	18.1	C	TR	0.81	18.4	C
Overall Intersection		-	**0.41**	**20.5**	**C**	-	**0.38**	**17.4**	**C**	-	**0.39**	**18.7**	**C**
(28) PARK AVENUE & 40th STREET													
Park Avenue	NB	TR	0.43	8.6	B	TR	0.49	8.7	B	TR	0.56	9.7	B
Park Avenue	SB	T	0.28	7.7	B	T	0.27	7.3	B	T	0.24	7.5	B
Park Avenue (tunnel)	NB	T	0.62	10.8	B	T	0.60	10.1	B	T	0.57	10.1	B
Park Avenue (viaduct)	SB	T	0.65	10.7	B	T	0.53	9.0	B	T	0.65	10.8	B
40th Street	EB	LT	0.91	36.0	D	LT	0.74	23.3	C	LTR	0.97	46.9	E
		R	0.42	17.1	C	R	0.49	19.0	C	R	0.49	18.3	C
Overall Intersection		-	**0.75**	**13.7**	**B**	-	**0.65**	**11.0**	**B**	-	**0.78**	**15.7**	**C**
(29) PARK AVENUE(SB) & 41st STREET													
Park Avenue	SB	LT	0.36	8.2	B	LT	0.26	7.6	B	LT	0.23	7.4	B
41st Street	EB	TR	0.41	16.6	C	TR	0.55	18.7	C	TR	0.67	21.3	C
Overall Intersection		-	**0.38**	**11.4**	**B**	-	**0.37**	**13.1**	**B**	-	**0.40**	**15.6**	**C**
(30) PARK AVENUE(NB) & 41st STREET													
Park Avenue	NB	TR	0.22	7.3	B	TR	0.27	7.6	B	TR	0.19	7.2	B
41st Street	EB	LT	0.46	17.2	C	LT	0.40	16.5	C	LT	0.62	19.9	C
Overall Intersection		-	**0.31**	**11.2**	**B**	-	**0.33**	**10.4**	**B**	-	**0.36**	**13.1**	**B**
(31) PARK AVENUE & 42nd STREET													
Park Avenue	NB	LR	0.20	14.4	B	LR	0.33	15.4	C	LR	0.29	15.0	B
		R	0.84	43.6	E	R	1.05	101.9	F	R	0.76	32.9	D
42nd Street	EB	TR	1.03	52.1	E	T	0.49	14.7	B	T	0.52	15.0	B
		-	-	-	-	R	0.63	15.5	C	R	0.98	62.8	F
42nd Street	WB	LT	0.71	12.4	B	LT	0.64	11.1	B	LT	0.61	10.8	B
Overall Intersection		-	**0.76**	**31.4**	**D**	-	**0.80**	**19.0**	**C**	-	**0.89**	**17.8**	**C**
(32) PARK AVENUE & 46th STREET													
Park Avenue	NB	TR	0.78	17.6	C	TR	0.94	26.3	D	TR	0.81	18.5	C
Park Avenue	SB	L	0.99	91.3	F	L	1.05	116.1	F	L	0.32	11.9	B
		T	0.98	32.1	D	T	0.85	20.1	C	T	0.86	20.3	C
46th Street	EB	LTR	0.45	12.0	B	LTR	0.61	13.9	B	LTR	0.56	13.0	B
Overall Intersection		-	**0.75**	**24.0**	**C**	-	**0.86**	**23.7**	**C**	-	**0.70**	**17.3**	**C**

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(33) PARK AVENUE & 47th STREET													
Park Avenue	NB	DFL	0.73	28.6	D	DFL	0.93	67.0	F	DFL	0.79	37.1	D
		T	0.81	9.3	B	T	0.80	9.0	B	T	0.84	10.1	B
Park Avenue	SB	T	0.55	6.2	B	TR	0.73	7.7	B	TR	0.75	8.0	B
		R	0.90	23.2	C	-	-	-	-	-	-	-	-
47th Street	WB	LTR	0.86	25.8	D	LTR	0.77	21.8	C	LTR	0.86	26.7	D
Overall Intersection		-	**0.89**	**12.7**	**B**	-	**0.90**	**11.8**	**B**	-	**0.85**	**12.3**	**B**
(34) PARK AVENUE & 48th STREET													
Park Avenue	NB	TR	0.65	6.9	B	TR	0.62	6.7	B	TR	0.72	7.5	B
Park Avenue	SB	DFL	1.05	112.3	F	DFL	0.73	28.6	D	DFL	0.73	28.6	D
	SB	T	0.96	16.5	C	T	0.85	10.2	B	T	0.92	13.7	B
48th Street	EB	LTR	0.72	21.0	C	LTR	0.89	29.3	D	LTR	0.73	21.1	C
Overall Intersection		-	**0.95**	**15.2**	**C**	-	**0.86**	**12.2**	**B**	-	**0.85**	**12.2**	**B**
(35) LEXINGTON AVENUE & 48th STREET													
Lexington Avenue	SB	LT	0.82	9.2	B	LT	0.86	15.5	C	LT	0.75	8.0	B
48th Street	EB	TR	0.70	20.2	C	TR	0.48	12.8	B	TR	0.67	19.5	C
Overall Intersection		-	**0.77**	**11.9**	**B**	-	**0.67**	**14.9**	**B**	-	**0.72**	**11.1**	**B**
(36) LEXINGTON AVENUE & 47th STREET													
Lexington Avenue	SB	TR	0.98	19.7	C	TR	0.92	18.4	C	TR	0.84	9.7	B
47th Street	WB	LT	0.73	20.7	C	LT	0.92	30.4	D	LT	0.61	18.5	C
Overall Intersection		-	**0.89**	**20.0**	**C**	-	**0.92**	**21.6**	**C**	-	**0.75**	**11.9**	**B**
(37) LEXINGTON AVENUE & 46th STREET													
Lexington Avenue	SB	LT	0.83	9.3	B	LT	0.84	14.8	B	LT	0.69	7.3	B
46th Street	EB	TR	0.77	24.3	C	TR	0.94	33.9	D	TR	0.76	21.2	C
Overall Intersection		-	**0.81**	**11.9**	**B**	-	**0.89**	**19.9**	**C**	-	**0.72**	**11.9**	**B**
(38) LEXINGTON AVENUE & 45th STREET													
Lexington Avenue	SB	TR	1.05	40.9	E	TR	1.05	47.5	E	TR	0.93	18.4	C
45th Street	WB	LT	0.72	21.0	C	LT	0.87	27.5	D	LT	0.65	19.3	C
Overall Intersection		-	**0.82**	**36.6**	**D**	-	**0.90**	**43.4**	**E**	-	**0.73**	**18.6**	**C**
(39) LEXINGTON AVENUE & 44th STREET													
Lexington Avenue	SB	LT	0.84	15.1	C	LT	1.05	50.3	E	LT	0.98	25.1	D
Overall Intersection		-	**0.39**	**15.1**	**C**	-	**0.45**	**50.3**	**E**	-	**0.46**	**25.1**	**D**
(40) LEXINGTON AVENUE & 43rd STREET													
Lexington Avenue	SB	T	0.95	21.7	C	T	0.70	10.1	B	T	0.79	14.4	B
43rd Street	WB	L	0.77	27.5	D	L	0.73	25.3	D	L	0.77	27.5	D
Overall Intersection		-	**0.77**	**22.3**	**C**	-	**0.67**	**11.9**	**B**	-	**0.69**	**16.0**	**C**
(41) LEXINGTON AVENUE & 42nd STREET													
Lexington Avenue	SB	LTR	1.04	43.6	E	LTR	0.95	23.9	C	LTR	0.97	27.0	D
42nd Street	EB	TR	1.03	52.1	E	TR	0.86	24.3	C	TR	0.85	23.6	C
42nd Street	WB	LT	0.98	38.7	D	LT	0.76	19.7	C	LT	0.78	20.3	C
Overall Intersection		-	**1.04**	**44.2**	**E**	-	**0.91**	**23.0**	**C**	-	**0.92**	**24.6**	**C**

Table __

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(42) LEXINGTON AVENUE & 41st STREET													
Lexington Avenue	SB	LT	0.94	16.9	C	LT	0.73	9.9	B	LT	0.70	9.6	B
41st Street	EB	TR	0.76	24.1	C	TR	0.70	20.8	C	TR	0.70	20.6	C
Overall Intersection		-	**0.86**	**17.7**	**C**	-	**0.71**	**11.3**	**B**	-	**0.70**	**11.2**	**B**
(43) LEXINGTON AVENUE & 40th STREET													
Lexington Avenue	SB	LT	0.88	10.6	B	LT	0.69	7.3	B	LT	0.65	7.0	B
40th Street	EB	TR	0.56	17.9	C	TR	0.56	17.9	C	TR	0.65	19.1	C
Overall Intersection		-	**0.75**	**12.0**	**B**	-	**0.64**	**9.6**	**B**	-	**0.65**	**10.3**	**B**
(44) THIRD AVENUE & 40th STREET													
Third Avenue	NB	TR	0.69	7.1	B	TR	0.68	7.0	B	TR	0.61	6.5	B
40th Street	EB	LT	0.63	19.2	C	LT	0.52	17.5	C	LT	0.63	19.0	C
Overall Intersection		-	**0.66**	**8.8**	**B**	-	**0.61**	**8.2**	**B**	-	**0.62**	**8.6**	**B**
(45) THIRD AVENUE & 41st STREET													
Third Avenue	NB	TR	0.70	7.2	B	TR	0.69	7.1	B	TR	0.61	6.5	B
41st Street	EB	LT	0.25	15.2	C	LT	0.52	18.0	C	LT	0.55	18.3	C
41st Street	WB	R	0.84	30.4	D	R	0.61	21.5	C	R	0.76	30.1	D
Overall Intersection		-	**0.75**	**9.9**	**B**	-	**0.66**	**8.4**	**B**	-	**0.67**	**8.8**	**B**
(46) THIRD AVENUE & 42nd STREET													
Third Avenue	NB	LT	0.98	27.3	D	LT	0.88	19.1	C	LT	0.81	16.7	C
		R	0.63	17.6	C	R	0.98	58.3	E	R	0.66	18.7	C
42nd Street	EB	LT	0.75	17.2	C	LT	0.77	17.8	C	LT	0.85	21.1	C
42nd Street	WB	T	0.72	22.8	C	T	0.52	19.8	C	T	0.58	20.5	C
		R	0.93	61.7	F	R	0.91	54.3	E	R	1.00	78.7	F
Overall Intersection		-	**0.86**	**25.8**	**D**	-	**0.88**	**22.2**	**C**	-	**0.83**	**20.3**	**C**
(47) THIRD AVENUE & 43rd STREET													
Third Avenue	NB	LT	0.80	8.3	B	LT	0.73	7.5	B	LT	0.70	7.2	B
43rd Street	WB	TR	1.02	64.4	F	TR	0.90	39.8	D	TR	0.93	42.6	E
Overall Intersection		-	**0.89**	**13.9**	**B**	-	**0.80**	**10.4**	**B**	-	**0.79**	**10.7**	**B**
(48) THIRD AVENUE & 44th STREET													
Third Avenue	NB	TR	0.88	9.9	B	TR	0.78	8.0	B	TR	0.75	7.7	B
44th Street	EB	LT	0.63	21.5	C	LT	0.70	23.6	C	LT	0.52	18.1	C
Overall Intersection		-	**0.78**	**10.4**	**B**	-	**0.75**	**8.9**	**B**	-	**0.66**	**8.3**	**B**
(49) THIRD AVENUE & 45th STREET													
Third Avenue	NB	LT	0.84	8.9	B	LT	0.75	7.7	B	LT	0.71	7.3	B
45th Street	WB	T	0.63	19.6	C	TR	0.91	38.4	D	TR	0.91	36.9	D
		R	0.84	38.6	D	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.84**	**11.1**	**B**	-	**0.81**	**10.9**	**B**	-	**0.79**	**10.8**	**B**
(50) THIRD AVENUE & 46th STREET													
Third Avenue	NB	TR	0.77	7.9	B	TR	0.84	14.2	B	TR	0.64	6.7	B
46th Street	EB	LT	0.94	42.1	E	LT	0.45	12.5	B	LT	0.71	20.1	C
Overall Intersection		-	**0.84**	**11.6**	**B**	-	**0.65**	**13.9**	**B**	-	**0.66**	**9.5**	**B**
(51) THIRD AVENUE & 47th STREET													

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**
(51) THIRD AVENUE & 47th STREET													
Third Avenue	NB	LT	0.77	7.9	B	LT	0.83	14.0	B	LT	0.66	6.9	B
47th Street	WB	TR	0.60	18.4	C	TR	1.00	48.9	E	TR	1.02	65.5	F
Overall Intersection		-	**0.70**	**9.6**	**B**	-	**0.92**	**19.3**	**C**	-	**0.80**	**13.6**	**B**
(52) THIRD AVENUE & 48th STREET													
Third Avenue	NB	TR	0.73	7.5	B	TR	0.81	13.6	B	TR	0.62	6.6	B
48th Street	EB	LT	1.04	67.1	F	LT	0.97	43.0	E	LT	0.67	19.5	C
Overall Intersection		-	**0.85**	**15.0**	**B**	-	**0.89**	**17.8**	**C**	-	**0.64**	**9.0**	**B**
(53) SECOND AVENUE & 42nd STREET													
Second Avenue	SB	LTR	0.87	16.0	C	LTR	0.85	15.7	C	LTR	0.84	15.2	C
42nd Street	EB	TR	0.73	19.1	C	TR	0.72	18.8	C	TR	0.75	19.3	C
42nd Street	WB	LT	1.04	59.9	E	LT	0.76	20.7	C	LT	0.82	23.0	C
Overall Intersection		-	**0.95**	**22.3**	**C**	-	**0.81**	**16.9**	**C**	-	**0.83**	**16.9**	**C**
(54) FIRST AVENUE & 42nd STREET													
First Avenue	NB	LTR	0.27	11.2	B	LTR	0.22	10.8	B	LTR	0.21	10.8	B
42nd Street	EB	L	1.01	67.5	F	L	0.86	31.1	D	L	0.92	42.1	E
		T	0.72	18.4	C	T	0.75	19.1	C	T	0.81	22.3	C
42nd Street	WB	TR	0.51	17.2	C	T	0.29	15.4	C	T	0.37	16.0	C
		R	1.00	58.8	E	R	0.81	27.6	D	R	0.98	51.2	E
Overall Intersection		-	**0.64**	**29.9**	**D**		**0.57**	**20.2**	**C**	-	**0.58**	**27.3**	**D**

UNSIGNALIZED INTERSECTIONS

			Avg. Total	95% Queue			Avg. Total	95% Queue			Avg. Total	95% Queue	
INTERSECTION & APPROACH		**Mvt.**	**Delay**	**Length**	**LOS**	**Mvt.**	**Delay**	**Length**	**LOS**	**Mvt.**	**Delay**	**Length**	**LOS**
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	7.4	1.0	B	L	6.2	0.4	B	L	6.3	0.8	B
		R	3.4	0.4	A	R	3.2	0.2	A	R	3.2	0.3	A
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.7	0.2	A	L	2.9	0.2	A	L	2.8	0.1	A
43rd Street	WB	TR	6.8	1.5	B	TR	5.5	0.6	B	TR	6.1	0.8	B

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping.
refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that
cto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left
es change in different time periods. For example, a very heavy right-turn volume
may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that v/c ratios that exceed 1.05 and corresponding average delays are greater than 120 seconds.

6. 95% queue length is expressed in vehicles.

TABLE M-2

2010 NO BUILD
LIRR / GCT TRAFFIC
LEVELS OF SERVICE

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(1) SEVENTH AVENUE & 42nd STREET													
Seventh Avenue	SB	LTR	1.05	120.0+	*F**	LTR	0.68	12.1	B	LTR	0.81	14.5	B
42nd Street	EB	TR	0.79	21.8	C	TR	0.85	23.8	C	TR	0.80	22.0	C
42nd Street	WB	LT	0.60	17.1	C	LT	0.64	17.6	C	LT	0.90	28.4	D
Overall Intersection		-	**0.94**	**120.0+**	**F***	-	**0.75**	**16.2**	**C**	-	**0.85**	**18.7**	**C**
(2) BROADWAY & 42nd STREET													
Broadway	SB	LTR	0.73	14.1	B	LTR	0.60	12.2	B	LTR	0.67	13.1	B
42nd Street	EB	TR	0.54	15.3	C	TR	0.67	17.2	C	TR	0.56	15.5	C
42nd Street	WB	L	1.09	120.0+	*F**	LT	1.17	120.0+	*F**	LT	1.20+	120.0+	*F**
		T	1.06	120.0+	*F**	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.89**	**120.0+**	**F***	-	**0.86**	**120.0+**	**F***	-	**0.94**	**120.0+**	**F***
(3) SIXTH AVENUE & 42nd STREET													
Sixth Avenue	NB	LT	1.05	43.1	E	LT	0.87	16.7	C	LTR	1.08	120.0+	F*
		R	0.77	23.2	C	R	0.37	10.1	B	R	0.47	11.3	B
42nd Street	EB	LT	0.79	20.7	C	LT	0.79	20.7	C	LT	0.79	20.9	C
42nd Street	WB	TR	0.79	20.6	C	TR	0.71	18.2	C	TR	0.74	19.0	C
		R	1.08	105.2	*F**	R	1.16	120.0+	*F**	R	1.16	120.0+	*F**
Overall Intersection		-	**1.06**	**120.0+**	**F***	-	**1.00**	**120.0+**	**F***	-	**1.12**	**120.0+**	**F***
(4) FIFTH AVENUE & 48th STREET													
Fifth Avenue	SB	LT	0.79	10.6	B	LT	0.85	14.8	B	LT	0.72	9.6	B
48th Street	EB	TR	0.52	15.6	C	TR	0.59	14.0	B	TR	0.82	21.7	C
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.72**	**14.6**	**B**	-	**0.76**	**13.1**	**B**
(5) FIFTH AVENUE & 47th STREET													
Fifth Avenue	SB	TR	0.69	9.2	B	TR	0.81	13.7	B	TR	0.69	9.3	B
47th Street	WB	LT	0.73	18.5	C	LT	0.63	14.7	B	LT	0.55	15.9	C
Overall Intersection		-	**0.70**	**11.8**	**B**	-	**0.72**	**13.9**	**B**	-	**0.63**	**10.7**	**B**
(6) FIFTH AVENUE & 46th STREET													
Fifth Avenue	SB	LT	0.72	9.5	B	LT	0.87	15.1	C	LT	0.72	9.6	B
46th Street	EB	TR	0.52	15.4	C	TR	0.54	13.5	B	TR	0.65	17.3	C
Overall Intersection		-	**0.63**	**10.8**	**B**	-	**0.70**	**14.8**	**B**	-	**0.69**	**11.4**	**B**
(7) FIFTH AVENUE & 45th STREET													
Fifth Avenue	SB	TR	0.79	10.6	B	TR	0.86	15.1	C	TR	0.73	9.7	B
45th Street	WB	LT	0.60	16.3	C	LT	1.05	66.0	F	LT	0.55	15.8	C
Overall Intersection		-	**0.71**	**11.9**	**B**	-	**0.96**	**23.2**	**C**	-	**0.65**	**11.1**	**B**
(8) FIFTH AVENUE & 44th STREET													
Fifth Avenue	SB	LT	0.77	10.2	B	LT	0.83	14.3	B	LT	0.72	9.7	B
44th Street	EB	TR	0.62	16.8	C	TR	0.50	13.0	B	TR	0.65	17.5	C
Overall Intersection		-	**0.70**	**11.6**	**B**	-	**0.66**	**14.0**	**B**	-	**0.69**	**11.3**	**B**
(9) FIFTH AVENUE & 43rd STREET													
Fifth Avenue	SB	TR	0.79	10.5	B	TR	0.88	15.6	C	TR	0.77	10.3	B
43rd Street	WB	LT	0.52	15.5	C	LT	1.10	120.0+	*F**	LT	0.49	15.2	C
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.99**	**120.0+**	**F***	-	**0.65**	**11.2**	**B**
(10) FIFTH AVENUE & 42nd STREET													
Fifth Avenue	SB	LTR	0.70	12.9	B	LTR	0.72	13.1	B	LTR	0.68	12.5	B
42nd Street	EB	TR	0.90	26.6	D	TR	0.88	25.5	D	TR	0.93	29.4	D
42nd Street	WB	LT	1.06	120.0+	*F**	LT	1.05	55.4	E	LT	1.13	120.0+	*F**
Overall Intersection		-	**0.86**	**120.0+**	**F***	-	**0.86**	**26.1**	**D**	-	**0.88**	**120.0+**	**F***

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(11) FIFTH AVENUE & 41st STREET													
Fifth Avenue	SB	LT	0.69	6.2	B	LT	0.67	6.0	B	LT	0.68	6.2	B
Overall Intersection		-	**0.42**	**6.2**	**B**	-	**0.41**	**6.0**	**B**	-	**0.42**	**6.2**	**B**
(12) FIFTH AVENUE & 40th STREET													
Fifth Avenue	SB	LT	0.72	9.7	B	LT	0.68	9.2	B	LT	0.69	9.4	B
40th Street	EB	TR	0.59	16.3	C	TR	0.56	16.0	C	TR	0.74	19.3	C
Overall Intersection		-	**0.66**	**11.3**	**B**	-	**0.63**	**10.7**	**B**	-	**0.71**	**12.1**	**B**
(13) MADISON AVENUE & 40th STREET													
Madison Avenue	NB	TR	0.85	12.4	B	TR	0.96	22.2	C	TR	0.90	14.3	B
40th Street	EB	LT	0.70	18.4	C	LT	0.48	12.8	B	LT	0.58	16.2	C
Overall Intersection		-	**0.79**	**14.2**	**B**	-	**0.72**	**20.1**	**C**	-	**0.76**	**14.8**	**B**
(14) MADISON AVENUE & 41st STREET													
Madison Avenue	NB	TR	0.89	13.9	B	TR	0.95	21.2	C	TR	0.86	12.7	B
41st Street	EB	LT	0.77	27.0	D	LT	0.59	15.3	C	LT	0.50	15.8	C
Overall Intersection		-	**0.84**	**15.2**	**C**	-	**0.77**	**20.5**	**C**	-	**0.70**	**13.0**	**B**
(15) MADISON AVENUE & 42nd STREET													
Madison Avenue	NB	LTR	0.89	18.4	C	LTR	0.95	25.9	D	LTR	0.86	17.1	C
42nd Street	EB	LT	1.09	120.0+	*F**	LT	1.11	120.0+	*F**	LT	1.03	51.1	E
42nd Street	WB	T	0.92	28.7	D	T	0.79	18.0	C	T	0.92	28.5	D
Overall Intersection		-	**0.98**	**120.0+**	**F***	-	**0.87**	**120.0+**	**F***	-	**0.93**	**28.8**	**D**
(16) MADISON AVENUE & 43rd STREET													
Madison Avenue	NB	LT	0.60	8.5	B	LT	0.66	11.8	B	LT	0.58	8.4	B
43rd Street	WB	TR	0.54	15.8	C	TR	0.41	12.2	B	TR	0.44	14.7	B
Overall Intersection		-	**0.58**	**10.3**	**B**	-	**0.54**	**11.9**	**B**	-	**0.52**	**9.7**	**B**
(17) MADISON AVENUE & 44th STREET													
Madison Avenue	NB	TR	0.57	8.3	B	TR	0.59	11.1	B	TR	0.52	8.0	B
44th Street	EB	LT	0.95	38.7	D	LT	0.73	18.1	C	LT	0.62	17.0	C
Overall Intersection		-	**0.74**	**16.1**	**C**	-	**0.66**	**12.5**	**B**	-	**0.56**	**10.1**	**B**
(18) MADISON AVENUE & 45th STREET													
Madison Avenue	NB	LT	0.67	9.1	B	LT	0.69	12.1	B	LT	0.64	8.9	B
45th Street	WB	TR	0.71	18.3	C	TR	1.00	50.4	E	TR	0.55	15.9	C
Overall Intersection		-	**0.68**	**11.7**	**B**	-	**0.84**	**19.5**	**C**	-	**0.60**	**10.6**	**B**
(19) MADISON AVENUE & 46th STREET													
Madison Avenue	NB	TR	0.62	8.7	B	TR	0.69	12.1	B	TR	0.63	8.8	B
46th Street	EB	LT	0.67	17.6	C	LT	0.97	40.8	E	LT	0.69	18.1	C
Overall Intersection		-	**0.64**	**11.2**	**B**	-	**0.83**	**18.3**	**C**	-	**0.66**	**11.5**	**B**
(20) MADISON AVENUE & 47th STREET													
Madison Avenue	NB	LT	0.66	9.0	B	LT	0.67	11.8	B	LT	0.57	8.3	B
47th Street	WB	TR	0.73	18.5	C	TR	0.58	13.9	B	TR	0.57	16.0	C
Overall Intersection		-	**0.69**	**12.1**	**B**	-	**0.63**	**12.4**	**B**	-	**0.57**	**10.4**	**B**
(21) MADISON AVENUE & 48th STREET													
Madison Avenue	NB	TR	0.69	9.3	B	TR	0.70	12.2	B	TR	0.58	8.3	B
48th Street	EB	LT	0.47	15.0	B	LT	0.57	13.8	B	LT	0.69	17.8	C
Overall Intersection		-	**0.59**	**10.5**	**B**	-	**0.64**	**12.6**	**B**	-	**0.62**	**11.2**	**B**

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(22) VANDERBILT AVENUE & 47th STREET													
Vanderbilt Avenue	NB	L	0.21	13.0	B	L	0.12	12.5	B	L	0.19	12.9	B
47th Street	WB	LT	0.86	18.7	C	LT	0.77	15.2	A	LT	0.62	12.2	B
Overall Intersection		-	**0.57**	**18.4**	**C**	-	**0.49**	**15.1**	**C**	-	**0.43**	**12.3**	**B**
(23) VANDERBILT AVENUE & 46th STREET													
Vanderbilt Avenue	NB	TR	0.49	13.4	B	TR	0.78	23.8	C	TR	0.44	12.6	B
Vanderbilt Avenue	SB	LT	0.40	12.1	B	LT	0.37	11.9	B	LT	0.32	11.5	B
46th Street	EB	LTR	0.58	13.8	B	LTR	0.43	12.3	B	LTR	0.54	13.4	B
Overall Intersection		-	**0.53**	**13.3**	**B**	-	**0.61**	**14.7**	**B**	-	**0.49**	**12.8**	**B**
(24) VANDERBILT AVENUE & 45th STREET													
Vanderbilt Avenue	NB	LT	1.05	76.9	F	LT	0.30	11.4	B	LT	0.37	11.9	B
Vanderbilt Avenue	SB	TR	0.78	20.2	C	TR	0.53	13.7	B	TR	0.37	12.0	B
45th Street	WB	LTR	0.86	26.4	D	LTR	0.39	12.0	B	LTR	0.94	33.9	D
Overall Intersection		-	**0.96**	**36.8**	**D**	-	**0.46**	**12.4**	**B**	-	**0.66**	**23.6**	**C**
(27) VANDERBILT AVENUE & 42nd STREET													
42nd Street	EB	LT	0.88	22.9	C	LT	0.82	19.2	C	LT	0.91	25.3	D
42nd Street	WB	TR	0.91	24.7	C	TR	0.88	22.1	C	TR	0.90	23.5	C
Overall Intersection		-	**0.44**	**23.9**	**C**	-	**0.43**	**20.8**	**C**	-	**0.44**	**24.3**	**C**
(28) PARK AVENUE & 40th STREET													
Park Avenue	NB	TR	0.46	8.8	B	TR	0.52	9.0	B	TR	0.60	10.2	B
Park Avenue	SB	T	0.30	7.8	B	T	0.30	7.4	B	T	0.26	7.6	B
Park Avenue (tunnel)	NB	T	0.66	11.5	B	T	0.64	10.6	B	T	0.60	10.5	B
Park Avenue (viaduct)	SB	T	0.69	11.3	B	T	0.56	9.3	B	T	0.69	11.4	B
40th Street	EB	LT	0.97	45.7	E	LT	0.80	26.2	D	LT	1.06	120.0+	*F**
		R	0.52	19.4	C	R	0.56	21.1	C	R	0.56	20.4	C
Overall Intersection		-	**0.80**	**15.5**	**C**	-	**0.70**	**11.7**	**B**	-	**0.84**	**120.0+**	**F***
(29) PARK AVENUE(SB) & 41st STREET													
Park Avenue	SB	LT	0.39	8.4	B	LT	0.28	7.7	B	LT	0.25	7.5	B
41st Street	EB	TR	0.45	17.1	C	TR	0.59	19.7	C	TR	0.69	22.2	C
Overall Intersection		-	**0.41**	**11.8**	**B**	-	**0.40**	**13.6**	**B**	-	**0.42**	**16.0**	**C**
(30) PARK AVENUE(NB) & 41st STREET													
Park Avenue	NB	TR	0.24	7.4	B	TR	0.29	7.7	B	TR	0.20	7.3	B
41st Street	EB	LT	0.49	17.6	C	LT	0.42	16.7	C	LT	0.65	20.7	C
Overall Intersection		-	**0.34**	**11.4**	**B**	-	**0.34**	**10.4**	**B**	-	**0.38**	**13.5**	**B**
(31) PARK AVENUE & 42nd STREET													
Park Avenue	NB	LR	0.27	14.9	B	LR	0.37	15.8	C	LR	0.31	15.2	C
		R	1.02	92.7	F	R	1.20+	120.0+	*F**	R	0.98	80.2	F
42nd Street	EB	TR	1.11	120.0+	*F**	T	0.55	15.3	C	T	0.59	15.8	C
		-			-	R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**
42nd Street	WB	LT	0.77	13.6	B	LT	0.72	12.4	B	LT	0.70	12.1	B
Overall Intersection		-	**0.87**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**1.16**	**120.0+**	**F***
(32) PARK AVENUE & 46th STREET													
Park Avenue	NB	TR	0.83	19.0	C	TR	0.99	35.3	D	TR	0.87	20.4	C
Park Avenue	SB	L	1.11	120.0+	*F**	L	1.19	120.0+	*F**	L	1.20+	120.0+	*F**
		T	1.04	46.0	E	T	0.90	23.3	C	T	0.91	23.6	C
46th Street	EB	LTR	0.48	12.3	B	LTR	0.66	14.6	B	LTR	0.60	13.5	B
Overall Intersection		-	**0.83**	**120.0+**	**F***	-	**0.96**	**120.0+**	**F***	-	**1.12**	**120.0+**	**F***

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(33) PARK AVENUE & 47th STREET													
Park Avenue	NB	DFL	0.79	37.1	D	DFL	0.99	87.5	F	DFL	0.85	48.5	E
		T	0.86	10.7	B	T	0.85	10.2	B	T	0.90	12.1	B
Park Avenue	SB	T	0.58	6.4	B	TR	0.78	8.4	B	TR	0.80	8.7	B
		R	1.04	55.3	E	-	-	-	-	-	-	-	-
47th Street	WB	LTR	0.91	30.1	D	LTR	0.82	24.0	C	LTR	0.93	33.6	D
Overall Intersection		-	**0.99**	**16.6**	**C**	-	**0.97**	**13.3**	**B**	-	**0.92**	**14.7**	**B**
(34) PARK AVENUE & 48th STREET													
Park Avenue	NB	TR	0.69	7.2	B	TR	0.66	7.0	B	TR	0.76	8.1	B
Park Avenue	SB	DFL	1.19	120.0+	*F**	DFL	0.85	48.5	E	DFL	0.85	48.5	E
		T	1.01	27.1	D	T	0.90	12.2	B	T	0.98	20.0	C
48th Street	EB	LTR	0.78	22.8	C	LTR	0.97	40.6	E	LTR	0.79	23.1	C
Overall Intersection		-	**1.08**	**120.0+**	**F***	-	**0.93**	**15.4**	**C**	-	**0.91**	**15.6**	**C**
(35) LEXINGTON AVENUE & 48th STREET													
Lexington Avenue	SB	LT	0.88	10.7	B	LT	0.92	18.1	C	LT	0.80	8.7	B
48th Street	EB	TR	0.75	21.7	C	TR	0.52	13.2	B	TR	0.72	20.5	C
Overall Intersection		-	**0.83**	**13.3**	**B**	-	**0.72**	**16.9**	**C**	-	**0.77**	**11.9**	**B**
(36) LEXINGTON AVENUE & 47th STREET													
Lexington Avenue	SB	TR	1.04	34.1	D	TR	0.98	24.3	C	TR	0.89	11.3	B
47th Street	WB	LT	0.79	22.3	C	LT	0.99	41.4	E	LT	0.64	19.0	C
Overall Intersection		-	**0.94**	**31.0**	**D**	-	**0.98**	**28.9**	**D**	-	**0.79**	**13.2**	**B**
(37) LEXINGTON AVENUE & 46th STREET													
Lexington Avenue	SB	LT	0.89	10.9	B	LT	0.89	16.5	C	LT	0.73	7.8	B
46th Street	EB	TR	0.84	28.6	D	TR	1.01	48.6	E	TR	0.81	22.9	C
Overall Intersection		-	**0.87**	**13.9**	**B**	-	**0.95**	**25.0**	**C**	-	**0.76**	**12.8**	**B**
(38) LEXINGTON AVENUE & 45th STREET													
Lexington Avenue	SB	TR	1.12	120.0+	*F**	TR	1.12	**120.0+**	*F**	TR	0.99	25.3	D
45th Street	WB	LT	0.79	23.4	C	LT	0.95	38.9	D	LT	0.69	20.3	C
Overall Intersection		-	**0.88**	**120.0+**	**F***	-	**0.97**	**120.0+**	**F***	-	**0.78**	**24.2**	**C**
(39) LEXINGTON AVENUE & 44th STREET													
Lexington Avenue	SB	LT	0.89	16.8	C	LT	1.12	**120.0+**	*F**	LT	1.04	40.2	E
Overall Intersection		-	**0.42**	**16.8**	**C**	-	**0.48**	**120.0+**	**F***	-	**0.49**	**40.2**	**E**
(40) LEXINGTON AVENUE & 43rd STREET													
Lexington Avenue	SB	T	1.01	31.9	D	T	0.74	10.6	B	T	0.84	15.5	C
43rd Street	WB	L	0.97	58.7	E	L	0.92	48.0	E	L	0.97	58.7	E
Overall Intersection		-	**0.87**	**34.7**	**D**	-	**0.77**	**15.0**	**B**	-	**0.79**	**20.7**	**C**
(41) LEXINGTON AVENUE & 42nd STREET													
Lexington Avenue	SB	LTR	1.11	120.0+	*F**	LTR	1.00	33.6	D	LTR	1.03	41.2	E
42nd Street	EB	TR	1.09	120.0+	*F**	TR	0.95	33.5	D	TR	0.95	32.9	D
42nd Street	WB	LT	1.06	120.0+	*F**	LT	0.88	25.3	D	LT	0.92	28.4	D
Overall Intersection		-	**1.10**	**120.0+**	**F***	-	**0.98**	**31.5**	**D**	-	**1.00**	**36.1**	**D**

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(42) LEXINGTON AVENUE & 41st STREET													
Lexington Avenue	SB	LT	1.00	25.5	D	LT	0.78	10.6	B	LT	0.75	10.2	B
41st Street	EB	TR	0.82	28.4	D	TR	0.75	23.4	C	TR	0.75	22.9	C
Overall Intersection		-	**0.92**	**25.8**	**D**	-	**0.77**	**12.3**	**B**	-	**0.75**	**12.1**	**B**
(43) LEXINGTON AVENUE & 40th STREET													
Lexington Avenue	SB	LT	0.93	12.9	B	LT	0.73	7.8	B	LT	0.69	7.3	B
40th Street	EB	TR	0.60	18.4	C	TR	0.61	18.6	C	TR	0.71	20.5	C
Overall Intersection		-	**0.80**	**14.0**	**B**	-	**0.68**	**10.2**	**B**	-	**0.70**	**11.0**	**B**
(44) THIRD AVENUE & 40th STREET													
Third Avenue	NB	TR	0.73	7.5	B	TR	0.72	7.4	B	TR	0.66	6.8	B
40th Street	EB	LT	0.68	20.2	C	LT	0.57	18.2	C	LT	0.69	20.2	C
Overall Intersection		-	**0.71**	**9.2**	**B**	-	**0.66**	**8.7**	**B**	-	**0.67**	**9.1**	**B**
(45) THIRD AVENUE & 41st STREET													
Third Avenue	NB	TR	0.74	7.6	B	TR	0.74	7.6	B	TR	0.66	6.8	B
41st Street	EB	LT	0.27	15.3	C	LT	0.56	18.6	C	LT	0.57	18.7	C
41st Street	WB	R	0.96	49.1	E	R	0.69	25.5	D	R	0.89	46.7	E
Overall Intersection		-	**0.83**	**12.0**	**B**	-	**0.72**	**9.0**	**B**	-	**0.75**	**9.9**	**B**
(46) THIRD AVENUE & 42nd STREET													
Third Avenue	NB	LT	1.05	43.4	E	LT	0.95	23.3	C	LT	0.87	18.3	C
		R	0.73	23.2	C	R	1.14	120.0+	*F**	R	0.76	24.9	C
42nd Street	EB	LT	0.81	19.4	C	LT	0.87	22.5	C	LT	0.97	34.4	D
42nd Street	WB	T	0.76	23.8	C	T	0.59	20.6	C	T	0.67	21.8	C
		R	1.09	120.0+	*F**	R	1.06	120.0+	*F**	R	1.16	120.0+	*F**
Overall Intersection		-	**0.93**	**120.0+**	**F***	-	**1.00**	**120.0+**	**F***	-	**0.92**	**120.0+**	**F***
(47) THIRD AVENUE & 43rd STREET													
Third Avenue	NB	LT	0.85	9.2	B	LT	0.78	8.0	B	LT	0.75	7.7	B
43rd Street	WB	TR	1.13	120.0+	*F**	TR	0.99	57.3	E	TR	1.01	63.8	F
Overall Intersection		-	**0.96**	**120.0+**	**F***	-	**0.86**	**12.5**	**B**	-	**0.85**	**13.2**	**B**
(48) THIRD AVENUE & 44th STREET													
Third Avenue	NB	TR	0.94	12.2	B	TR	0.83	8.7	B	TR	0.80	8.3	B
44th Street	EB	LT	0.70	24.2	C	LT	0.75	26.6	D	LT	0.57	19.1	C
Overall Intersection		-	**0.84**	**12.8**	**B**	-	**0.80**	**9.8**	**B**	-	**0.71**	**8.9**	**B**
(49) THIRD AVENUE & 45th STREET													
Third Avenue	NB	LT	0.89	10.0	B	LT	0.80	8.2	B	LT	0.76	7.8	B
45th Street	WB	T	0.66	20.4	C	TR	0.99	55.9	E	TR	0.97	47.4	E
		R	0.97	65.2	F	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.92**	**13.4**	**B**	-	**0.87**	**13.4**	**B**	-	**0.84**	**12.5**	**B**
(50) THIRD AVENUE & 46th STREET													
Third Avenue	NB	TR	0.82	8.6	B	TR	0.90	15.7	C	TR	0.68	7.0	B
46th Street	EB	LT	1.02	62.8	F	LT	0.49	12.9	B	LT	0.76	21.3	C
Overall Intersection		-	**0.90**	**14.6**	**B**	-	**0.69**	**15.2**	**C**	-	**0.71**	**10.0**	**B**

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**
(51) THIRD AVENUE & 47th STREET													
Third Avenue	NB	LT	0.82	8.6	B	LT	0.90	15.5	C	LT	0.71	7.2	B
47th Street	WB	TR	0.65	19.1	C	TR	1.08	120.0+	*F**	TR	1.12	120.0+	*F**
Overall Intersection		-	**0.75**	**10.3**	**B**	-	**0.98**	**120.0+**	**F***	-	**0.87**	**120.0+**	**F***
(52) THIRD AVENUE & 48th STREET													
Third Avenue	NB	TR	0.78	8.0	B	TR	0.86	14.8	B	TR	0.66	6.9	B
48th Street	EB	LT	1.13	120.0+	*F**	LT	1.05	65.1	F	LT	0.71	20.5	C
Overall Intersectio		-	**0.92**	**120.0+**	**F***	-	**0.96**	**21.9**	**C**	-	**0.68**	**9.4**	**B**
(53) SECOND AVENUE & 42nd STREET													
Second Avenue	SB	LTR	0.93	18.5	C	LTR	0.92	18.2	C	LTR	0.90	17.1	C
42nd Street	EB	TR	0.78	20.7	C	TR	0.79	20.7	C	TR	0.82	21.7	C
42nd Street	WB	LT	1.14	120.0+	*F**	LT	0.86	26.0	D	LT	0.94	35.0	D
Overall Intersection		-	**1.02**	**120.0+**	**F***	-	**0.89**	**19.6**	**C**	-	**0.92**	**20.4**	**C**
(54) FIRST AVENUE & 42nd STREET													
First Avenue	NB	LTR	0.29	11.3	B	LTR	0.24	10.9	B	LTR	0.23	10.9	B
42nd Street	EB	L	1.13	120.0+	*F**	L	0.96	46.2	E	L	1.06	120.0+	*F**
		T	0.77	20.3	C	T	0.81	22.0	C	T	0.88	28.4	D
42nd Street	WB	TR	0.54	17.6	C	T	0.31	15.5	C	T	0.40	16.2	C
		R	1.07	120.0+	*F**	R	0.86	32.6	D	R	1.11	120.0+	*F**
Overall Intersection		-	**0.70**	**120.0+**	**F***		**0.61**	**24.6**	**C**	-	**0.67**	**120.0+**	**F***

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET												
44th Street	EB	L	10.3	1.5	C	L	6.5	0.5	B	L	6.6	0.9	B
		R	3.5	0.4	A	R	3.3	0.2	A	R	3.3	0.4	A
(26) VANDERBILT AVENUE & 43rd STREET												
Vanderbilt Avenue	NB	L	2.8	0.2	A	L	2.9	0.2	A	L	2.8	0.1	A
43rd Street	WB	TR	7.4	1.7	B	TR	5.7	0.7	B	TR	6.4	0.9	B

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping. refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that acto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left es change in different time periods. For example, a very heavy right-turn volume may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

TABLE M-3

2010 BUILD / MITIGATED LIRR / GCT TRAFFIC LEVELS OF SERVICE

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(1) SEVENTH AVENUE & 42nd STREET														
Seventh Avenue	SB	LTR	1.05	120.0+	*F**	LTR	0.96	23.8	C					
42nd Street	EB	TR	0.79	21.8	C	TR	0.76	20.6	C			n/a		
42nd Street	WB	LT	0.60	17.1	C	LT	0.56	16.6	C					
Overall Intersection		-	**0.94**	**120.0+**	**F***	-	**0.87**	**22.1**	**C**					
(2) BROADWAY & 42nd STREET														
Broadway	SB	LTR	0.73	14.1	B	LTR	0.72	13.9	B					
42nd Street	EB	TR	0.54	15.3	C	TR	0.50	14.9	B			n/a		
42nd Street	WB	L	1.09	120.0+	*F**	L	1.02	76.8	F					
		T	1.06	120.0+	*F**	T	1.02	58.6	E					
Overall Intersection		-	**0.89**	**120.0+**	**F***	-	**0.86**	**26.9**	**D**					
(3) SIXTH AVENUE & 42nd STREET														
Sixth Avenue	NB	LT	1.05	43.1	E	LT	1.03	35.8	D					
		R	0.77	23.2	C	R	0.75	21.6	C					
42nd Street	EB	LT	0.79	20.7	C	LT	0.75	19.5	C			n/a		
42nd Street	WB	TR	0.79	20.6	C	TR	0.77	19.9	C					
		R	1.08	120.0+	*F**	R	1.06	120.0+	*F**					
Overall Intersection		-	**1.06**	**120.0+**	**F***	-	**1.04**	**120.0+**	**F***					
(4) FIFTH AVENUE & 48th STREET														
Fifth Avenue	SB	LT	0.79	10.6	B	LT	0.80	10.7	B					
48th Street	EB	TR	0.52	15.6	C	TR	0.55	15.9	C			n/a		
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.69**	**11.7**	**B**					
(5) FIFTH AVENUE & 47th STREET														
Fifth Avenue	SB	TR	0.69	9.2	B	TR	0.68	9.1	B					
47th Street	WB	LT	0.73	18.5	C	LT	0.75	19.2	C			n/a		
Overall Intersection		-	**0.70**	**11.8**	**B**	-	**0.71**	**11.9**	**B**					
(6) FIFTH AVENUE & 46th STREET														
Fifth Avenue	SB	LT	0.72	9.5	B	LT	0.72	9.5	B					
46th Street	EB	TR	0.52	15.4	C	TR	0.51	15.3	C			n/a		
Overall Intersection		-	**0.63**	**10.8**	**B**	-	**0.62**	**10.7**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(7) FIFTH AVENUE & 45th STREET														
Fifth Avenue	SB	TR	0.79	10.6	B	TR	0.77	10.2	B					
45th Street	WB	LT	0.60	16.3	C	LT	0.55	15.8	C			n/a		
Overall Intersection		-	**0.71**	**11.9**	**B**	-	**0.67**	**11.5**	**B**					
(8) FIFTH AVENUE & 44th STREET														
Fifth Avenue	SB	LT	0.77	10.2	B	LT	0.73	9.8	B					
44th Street	EB	TR	0.62	16.8	C	TR	0.63	17.1	C			n/a		
Overall Intersection		-	**0.70**	**11.6**	**B**	-	**0.69**	**11.4**	**B**					
(9) FIFTH AVENUE & 43rd STREET														
Fifth Avenue	SB	TR	0.79	10.5	B	TR	0.74	9.9	B					
43rd Street	WB	LT	0.52	15.5	C	LT	0.52	15.5	C			n/a		
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.64**	**10.9**	**B**					
(10) FIFTH AVENUE & 42nd STREET														
Fifth Avenue	SB	LTR	0.70	12.9	B	LTR	0.66	12.3	B					
42nd Street	EB	TR	0.90	26.6	D	TR	0.86	24.0	C			n/a		
42nd Street	WB	LT	1.06	120.0+	*F**	LT	1.02	47.7	E					
Overall Intersection		-	**0.86**	**120.0+**	**F***	-	**0.82**	**23.7**	**C**					
(11) FIFTH AVENUE & 41st STREET														
Fifth Avenue	SB	LT	0.69	6.2	B	LT	0.66	5.9	B			n/a		
Overall Intersection		-	**0.42**	**6.2**	**B**	-	**0.40**	**5.9**	**B**					
(12) FIFTH AVENUE & 40th STREET														
Fifth Avenue	SB	LT	0.72	9.7	B	LT	0.67	9.2	B					
40th Street	EB	TR	0.59	16.3	C	TR	0.58	16.1	C			n/a		
Overall Intersection		-	**0.66**	**11.3**	**B**	-	**0.63**	**10.9**	**B**					
(13) MADISON AVENUE & 40th STREET														
Madison Avenue	NB	TR	0.85	12.4	B	TR	0.84	12.2	B					
40th Street	EB	LT	0.70	18.4	C	LT	0.71	18.7	C			n/a		
Overall Intersection		-	**0.79**	**14.2**	**B**	-	**0.79**	**14.1**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(14) MADISON AVENUE & 41st STREET														
Madison Avenue	NB	TR	0.89	13.9	B	TR	0.89	13.9	B	TR	0.89	13.9	B	-Daylight the north curb on the EB approach to create a left-turn lane eastbound and provide a protected EB LT phase.
41st Street	EB	LT	0.77	27.0	D	LT	1.07	120.0+	*F**	L	0.67	22.5	C	
										T	0.13	12.5	B	
Overall Intersection		-	**0.84**	**15.2**	**C**	-	**0.97**	**120.0+**	**F***	-	**0.79**	**14.4**	**B**	
(15) MADISON AVENUE & 42nd STREET														
Madison Avenue	NB	LTR	0.89	18.4	C	LTR	0.87	17.5	C					
42nd Street	EB	LT	1.09	120.0+	*F**	LT	1.05	57.4	E		n/a			
42nd Street	WB	T	0.92	28.7	D	T	0.90	26.9	D					
Overall Intersection		-	**0.98**	**120.0+**	**F***	-	**0.95**	**30.1**	**D**					
(16) MADISON AVENUE & 43rd STREET														
Madison Avenue	NB	LT	0.60	8.5	B	LT	0.57	8.3	B					
43rd Street	WB	TR	0.54	15.8	C	TR	0.65	17.4	C		n/a			
Overall Intersection		-	**0.58**	**10.3**	**B**	-	**0.61**	**10.7**	**B**					
(17) MADISON AVENUE & 44th STREET														
Madison Avenue	NB	TR	0.57	8.3	B	TR	0.60	8.5	B					
44th Street	EB	LT	0.95	38.7	D	LT	0.92	33.9	D		n/a			
Overall Intersection		-	**0.74**	**16.1**	**C**	-	**0.74**	**15.0**	**B**					
(18) MADISON AVENUE & 45th STREET														
Madison Avenue	NB	LT	0.67	9.1	B	LT	0.66	9.0	B					
45th Street	WB	TR	0.71	18.3	C	TR	0.75	19.5	C		n/a			
Overall Intersection		-	**0.68**	**11.7**	**B**	-	**0.70**	**12.0**	**B**					
(19) MADISON AVENUE & 46th STREET														
Madison Avenue	NB	TR	0.62	8.7	B	TR	0.64	8.9	B					
46th Street	EB	LT	0.67	17.6	C	LT	0.67	17.6	C		n/a			
Overall Intersection		-	**0.64**	**11.2**	**B**	-	**0.66**	**11.2**	**B**					
(20) MADISON AVENUE & 47th STREET														
Madison Avenue	NB	LT	0.66	9.0	B	LT	0.70	9.4	B					
47th Street	WB	TR	0.73	18.5	C	TR	0.76	19.3	C		n/a			
Overall Intersection		-	**0.69**	**12.1**	**B**	-	**0.72**	**12.5**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(21) MADISON AVENUE & 48th STREET														
Madison Avenue	NB	TR	0.69	9.3	B	TR	0.79	10.6	B					
48th Street	EB	LT	0.47	15.0	B	LT	0.48	15.1	C			n/a		
Overall Intersection		-	**0.59**	**10.5**	**B**	-	**0.65**	**11.5**	**B**					
(22) VANDERBILT AVENUE & 47th STREET														
Vanderbilt Avenue	NB	L	0.21	13.0	B	L	0.19	12.9	B					
47th Street	WB	LT	0.86	18.7	C	LT	0.86	18.7	C			n/a		
Overall Intersection		-	**0.57**	**18.4**	**C**	-	**0.57**	**18.4**	**C**					
(23) VANDERBILT AVENUE & 46th STREET														
Vanderbilt Avenue	NB	TR	0.49	13.4	B	TR	0.55	14.4	B					
Vanderbilt Avenue	SB	LT	0.40	12.1	B	LT	0.39	12.1	B			n/a		
46th Street	EB	LTR	0.58	13.8	B	LTR	0.58	13.8	B					
Overall Intersection		-	**0.53**	**13.3**	**B**	-	**0.56**	**13.5**	**B**					
(24) VANDERBILT AVENUE & 45th STREET														
Vanderbilt Avenue	NB	LT	1.05	76.9	F	LT	1.06	120.0+	*F**					
Vanderbilt Avenue	SB	TR	0.78	20.2	C	TR	0.80	21.5	C					
45th Street	WB	LTR	0.86	26.4	D	LTR	0.90	30.6	D					
Overall Intersection		-	**0.96**	**36.8**	**D**	-	**0.98**	**120.0+**	**F***					
(27) VANDERBILT AVENUE & 42nd STREET														
42nd Street	EB	LT	0.88	22.9	C	LT	0.87	21.6	C					
42nd Street	WB	TR	0.91	24.7	C	TR	0.91	24.3	C			n/a		
Overall Intersection		-	**0.44**	**23.9**	**C**	-	**0.44**	**23.0**	**C**					
(28) PARK AVENUE & 40th STREET														
Park Avenue	NB	TR	0.46	8.8	B	TR	0.47	8.9	B					
Park Avenue	SB	T	0.30	7.8	B	T	0.30	7.8	B					
Park Avenue (tunnel)	NB	T	0.66	11.5	B	T	0.64	11.2	B					
Park Avenue (viaduct)	SB	T	0.69	11.3	B	T	0.65	10.8	B					
40th Street	EB	LT	0.97	45.7	E	LT	0.94	41.4	E					
		R	0.52	19.4	C	R	0.52	19.4	C					
Overall Intersection		-	**0.80**	**15.5**	**C**	-	**0.77**	**14.7**	**C**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(29) PARK AVENUE(SB) & 41st STREET														
Park Avenue	SB	LT	0.39	8.4	B	LT	0.40	8.5	B					
41st Street	EB	TR	0.45	17.1	C	TR	0.43	16.8	C					
Overall Intersection		-	**0.41**	**11.8**	**B**	-	**0.41**	**11.6**	**B**					
(30) PARK AVENUE(NB) & 41st STREET														
Park Avenue	NB	TR	0.24	7.4	B	TR	0.27	7.6	B					
41st Street	EB	LT	0.49	17.6	C	LT	0.42	16.7	C					
Overall Intersection		-	**0.34**	**11.4**	**B**	-	**0.33**	**10.9**	**B**					
(31) PARK AVENUE & 42nd STREET														
Park Avenue	NB	LR	0.27	14.9	B	LR	0.05	13.5	B	L	0.05	13.5	B	-Remove parking along the NB approach
		R	1.02	92.7	F	R	1.20+	120.0+	*F**	R	0.49	17.2	C	to provide two right-turn lanes and one
42nd Street	EB	TR	1.11	120.0+	*F**	TR	1.09	120.0+	*F**	TR	1.09	120.0+	*F**	left lane, adjust the signal timing to
42nd Street	WB	LT	0.77	13.6	B	LT	0.77	13.6	B	LT	0.77	13.6	B	provide a protected NB movement.
Overall Intersection		-	**0.87**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**0.65**	**120.0+**	**F***	
(32) PARK AVENUE & 46th STREET														
Park Avenue	NB	TR	0.83	19.0	C	TR	0.81	18.3	C	TR	0.81	18.3	C	-Remove parking along the SB approach
Park Avenue	SB	L	1.11	120.0+	*F**	L	1.19	120.0+	*F**	L	0.13	10.8	B	to provide two left-turn lanes and two
		T	1.04	46.0	E	T	0.99	34.2	D	T	0.93	24.8	C	through lanes.
46th Street	EB	LTR	0.48	12.3	B	LTR	0.50	12.4	B	LTR	0.50	12.4	B	
Overall Intersection		-	**0.83**	**120.0+**	**F***	-	**0.88**	**120.0+**	**F***	-	**0.71**	**19.5**	**C**	
(33) PARK AVENUE & 47th STREET														
Park Avenue	NB	DFL	0.79	37.1	D	DFL	0.79	37.1	D	LT	0.60	6.5	B	-Provide a protected N/S phase.
		T	0.86	10.7	B	T	0.85	10.2	B	-	-	-	-	
Park Avenue	SB	T	0.58	6.4	B	T	0.56	6.2	B	T	0.56	6.2	B	
		R	1.04	55.3	E	R	1.20+	120.0+	*F**	R	0.95	30.2	D	
47th Street	WB	LTR	0.91	30.1	D	LTR	0.93	31.4	D	LTR	0.93	31.4	D	
Overall Intersection		-	**0.92**	**16.6**	**C**	-	**1.20+**	**120.0+**	**F***	-	**0.94**	**13.1**	**B**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(34) PARK AVENUE & 48th STREET														
Park Avenue	NB	TR	0.69	7.2	B	TR	0.70	7.3	B	TR	0.69	7.2	B	-Provide a protected N/S phase and
Park Avenue	SB	DFL	1.19	120.0+	*F**	DFL	1.20+	120.0+	*F**	LT	0.72	7.5	B	daylight the south curb of the EB
		T	1.01	27.1	D	T	0.99	21.2	C	-	-	-	-	approach.
48th Street	EB	LTR	0.78	22.8	C	LTR	0.95	37.8	D	LTR	0.89	29.7	D	
Overall Intersection		-	**1.08**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**0.79**	**10.8**	**B**	
(35) LEXINGTON AVENUE & 48th STREET														
Lexington Avenue	SB	LT	0.88	10.7	B	LT	0.86	10.2	B					
48th Street	EB	TR	0.75	21.7	C	TR	0.81	23.8	C			n/a		
Overall Intersection		-	**0.83**	**13.3**	**B**	-	**0.84**	**13.7**	**B**					
(36) LEXINGTON AVENUE & 47th STREET														
Lexington Avenue	SB	TR	1.04	34.1	D	TR	1.02	27.2	D					
47th Street	WB	LT	0.79	22.3	C	LT	0.81	23.2	C			n/a		
Overall Intersection		-	**0.94**	**31.0**	**D**	-	**0.94**	**26.1**	**D**					
(37) LEXINGTON AVENUE & 46th STREET														
Lexington Avenue	SB	LT	0.89	10.9	B	LT	0.86	10.2	B					
46th Street	EB	TR	0.84	28.6	D	TR	0.85	29.1	D			n/a		
Overall Intersection		-	**0.87**	**13.9**	**B**	-	**0.86**	**13.5**	**B**					
(38) LEXINGTON AVENUE & 45th STREET														
Lexington Avenue	SB	TR	1.12	120.0+	*F**	TR	1.09	120.0+	*F**					
45th Street	WB	LT	0.79	23.4	C	LT	0.87	28.9	D			n/a		
Overall Intersection		-	**0.88**	**120.0+**	**F***	-	**0.90**	**120.0+**	**F***					
(39) LEXINGTON AVENUE & 44th STREET														
Lexington Avenue	SB	LT	0.89	16.8	C	LT	0.87	16.2	C			n/a		
Overall Intersection		-	**0.42**	**16.8**	**C**	-	**0.41**	**16.2**	**C**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(40) LEXINGTON AVENUE & 43rd STREET														
Lexington Avenue	SB	T	1.01	31.9	D	T	0.99	26.6	D	T	0.99	26.6	D	-Provide a protected WB signal phase.
43rd Street	WB	L	0.97	58.7	E	L	1.20+	120.0+	*F**	L	0.66	21.4	C	
Overall Intersection		-	**0.87**	**34.7**	**D**	-	**1.20+**	**120.0+**	**F***	-	**0.70**	**26.1**	**D**	
(41) LEXINGTON AVENUE & 42nd STREET														
Lexington Avenue	SB	LTR	1.11	120.0+	*F**	LTR	1.08	120.0+	*F**					
42nd Street	EB	TR	1.09	120.0+	*F**	TR	1.06	120.0+	*F**			n/a		
42nd Street	WB	LT	1.06	120.0+	*F**	LT	1.04	52.0	*E*					
Overall Intersection		-	**1.10**	**120.0+**	**F***	-	**1.07**	**120.0+**	**F***					
(42) LEXINGTON AVENUE & 41st STREET														
Lexington Avenue	SB	LT	1.00	25.5	D	LT	0.98	21.4	C					
41st Street	EB	TR	0.82	28.4	D	TR	0.84	30.5	D			n/a		
Overall Intersection		-	**0.92**	**25.8**	**D**	-	**0.92**	**22.4**	**C**					
(43) LEXINGTON AVENUE & 40th STREET														
Lexington Avenue	SB	LT	0.93	12.9	B	LT	0.91	11.8	B					
40th Street	EB	TR	0.60	18.4	C	TR	0.67	19.6	C			n/a		
Overall Intersection		-	**0.80**	**14.0**	**B**	-	**0.81**	**13.5**	**B**					
(44) THIRD AVENUE & 40th STREET														
Third Avenue	NB	TR	0.73	7.5	B	TR	0.71	7.3	B					
40th Street	EB	LT	0.68	20.2	C	LT	0.68	20.4	C			n/a		
Overall Intersection		-	**0.71**	**9.2**	**B**	-	**0.70**	**9.1**	**B**					
(45) THIRD AVENUE & 41st STREET														
Third Avenue	NB	TR	0.74	7.6	B	TR	0.72	7.4	B	TR	0.72	7.4	B	-Provide a protected E/W signal phase.
41st Street	EB	LT	0.27	15.3	C	LT	0.27	15.2	C	LT	0.27	15.2	C	
41st Street	WB	R	0.96	49.1	E	R	1.09	120.0+	*F**	R	0.71	22.2	C	
Overall Intersection		-	**0.83**	**12.0**	**B**	-	**0.87**	**120.0+**	**F***	-	**0.72**	**9.4**	**B**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(46) THIRD AVENUE & 42nd STREET														
Third Avenue	NB	LT	1.05	43.4	E	LT	1.05	44.2	E	LT	1.05	44.2	E	-Provide a protected E/W signal phase.
		R	0.73	23.2	C	R	0.77	26.6	D	R	0.77	26.7	D	
42nd Street	EB	LT	0.81	19.4	C	LT	0.76	17.5	C	LT	0.76	17.5	C	
42nd Street	WB	T	0.76	23.8	C	T	0.75	23.7	C	T	0.75	23.7	C	
		R	1.09	120.0+	*F**	R	1.20+	120.0+	*F**	R	0.95	68.5	F	
Overall Intersection		-	**0.93**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**0.90**	**37.4**	**D**	
(47) THIRD AVENUE & 43rd STREET														
Third Avenue	NB	LT	0.85	9.2	B	LT	0.83	8.7	B	LT	0.83	8.7	B	-Daylight the north curb to provide an
43rd Street	WB	TR	1.13	120.0+	*F**	TR	1.20+	120.0+	*F**	T	0.22	15.0	B	exclusive RT lane WB and provide a
										R	1.03	75.4	F	protected WB signal phase.
Overall Intersection		-	**0.96**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**0.91**	**13.5**	**B**	
(48) THIRD AVENUE & 44th STREET														
Third Avenue	NB	TR	0.94	12.2	B	TR	0.91	10.7	B					
44th Street	EB	LT	0.70	24.2	C	LT	0.70	24.2	C			n/a		
Overall Intersection		-	**0.84**	**12.8**	**B**	-	**0.83**	**11.4**	**B**					
(49) THIRD AVENUE & 45th STREET														
Third Avenue	NB	LT	0.89	10.0	B	LT	0.87	9.5	B	LT	0.87	9.5	B	-Daylight the north curb of the WB
45th Street	WB	T	0.66	20.4	C	T	0.67	20.6	C	T	0.67	20.6	C	approach to allow for a right-turn lane.
		R	0.97	65.2	F	R	1.04	91.0	F	R	0.91	50.7	E	
Overall Intersection		-	**0.92**	**13.4**	**B**	-	**0.94**	**14.1**	**B**	-	**0.88**	**12.3**	**B**	
(50) THIRD AVENUE & 46th STREET														
Third Avenue	NB	TR	0.82	8.6	B	TR	0.80	8.2	B	TR	0.80	8.2	B	-Daylight the north curb of the EB
46th Street	EB	LT	1.02	62.8	F	LT	1.12	120.0+	*F**	L	0.93	55.5	E	approach to allow for a left-turn lane.
										T	0.51	17.7	C	
Overall Intersection		-	**0.90**	**14.6**	**B**	-	**0.92**	**120.0+**	**F***	-	**0.85**	**10.9**	**B**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(51) THIRD AVENUE & 47th STREET														
Third Avenue	NB	LT	0.82	8.6	B	LT	0.81	8.4	B					
47th Street	WB	TR	0.65	19.1	C	TR	0.63	18.8	C		n/a			
Overall Intersection		-	**0.75**	**10.3**	**B**	-	**0.74**	**10.1**	**B**					
(52) THIRD AVENUE & 48th STREET														
Third Avenue	NB	TR	0.78	8.0	B	TR	0.76	7.8	B	TR	0.76	7.8	B	-Daylight the north curb of the EB
48th Street	EB	LT	1.13	120.0+	*F**	LT	1.20+	120.0+	*F**	L	0.96	59.1	E	approach to allow for a left-turn lane.
										T	0.61	19.2	C	
Overall Intersection		-	**0.92**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**0.84**	**11.6**	**B**	
(53) SECOND AVENUE & 42nd STREET														
Second Avenue	SB	LTR	0.93	18.5	C	LTR	0.91	17.6	C					
42nd Street	EB	TR	0.78	20.7	C	TR	0.76	19.9	C		n/a			
42nd Street	WB	LT	1.14	120.0+	*F**	LT	1.11	120.0+	*F**					
Overall Intersection		-	**1.02**	**120.0+**	**F***	-	**1.00**	**120.0+**	**F***					
(54) FIRST AVENUE & 42nd STREET														
First Avenue	NB	LTR	0.29	11.3	B	LTR	0.29	11.2	B					
42nd Street	EB	L	1.13	120.0+	*F**	L	1.08	120.0+	*F**					
		T	0.77	20.3	C	T	0.75	19.7	C					
42nd Street	WB	TR	0.54	17.6	C	TR	0.53	17.4	C					
		R	1.07	120.0+	*F**	R	1.05	73.8	*D*					
Overall Intersection		-	**0.70**	**120.0+**	**F***	-	**0.68**	**120.0+**	**F***					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

AM PEAK HOUR (8-9 AM)

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET												
44th Street	EB L	7.8	1.1	B	L	7.9	1.1	B				
	R	3.5	0.4	A	R	3.6	0.6	A			n/a	
(26) VANDERBILT AVENUE & 43rd STREET												
Vanderbilt Avenue	NB L	2.8	0.2	A	L	2.8	0.2	A				
43rd Street	WB TR	7.4	1.7	B	TR	8.0	2.1	B			n/a	

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping.
refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that
acto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left
ses change in different time periods. For example, a very heavy right-turn volume
may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(1) SEVENTH AVENUE & 42nd STREET														
Seventh Avenue	SB	LTR	0.68	12.1	B	LTR	0.66	11.9	B					
42nd Street	EB	TR	0.85	23.8	C	TR	0.82	22.4	C			n/a		
42nd Street	WB	LT	0.64	17.6	C	LT	0.62	17.4	C					
Overall Intersection		-	**0.75**	**16.2**	**C**	-	**0.73**	**15.7**	**C**					
(2) BROADWAY & 42nd STREET														
Broadway	SB	LTR	0.60	12.2	B	LTR	0.60	12.1	B					
42nd Street	EB	TR	0.67	17.2	C	TR	0.65	16.7	C			n/a		
42nd Street	WB	LT	1.17	120.0+	*F**	LT	1.14	120.0+	*F**					
		-	-	-	-	-	-	-	-					
Overall Intersection		-	**0.86**	**120.0+**	**F***	-	**0.84**	**120.0+**	**F***					
(3) SIXTH AVENUE & 42nd STREET														
Sixth Avenue	NB	LT	0.87	16.7	C	LT	0.87	16.4	C					
		R	0.37	10.1	B	R	0.37	10.1	B					
42nd Street	EB	LT	0.79	20.7	C	LT	0.76	19.8	C			n/a		
42nd Street	WB	TR	0.71	18.2	C	TR	0.70	18.2	C					
		R	1.16	120.0+	*F**	R	1.16	120.0+	*F**					
Overall Intersection		-	**1.00**	**120.0+**	**F***	-	**1.00**	**120.0+**	**F***					
(4) FIFTH AVENUE & 48th STREET														
Fifth Avenue	SB	LT	0.85	14.8	B	LT	0.86	15.1	C			n/a		
48th Street	EB	TR	0.59	14.0	B	TR	0.61	14.3	B					
Overall Intersection		-	**0.72**	**14.6**	**B**	-	**0.74**	**14.9**	**B**					
(5) FIFTH AVENUE & 47th STREET														
Fifth Avenue	SB	TR	0.81	13.7	B	TR	0.79	13.4	B			n/a		
47th Street	WB	LT	0.63	14.7	B	LT	0.63	14.7	B					
Overall Intersection		-	**0.72**	**13.9**	**B**	-	**0.71**	**13.7**	**B**					
(6) FIFTH AVENUE & 46th STREET														
Fifth Avenue	SB	LT	0.86	15.1	C	LT	0.86	15.0	B			n/a		
46th Street	EB	TR	0.54	13.5	B	TR	0.55	13.6	B					
Overall Intersection		-	**0.70**	**14.8**	**B**	-	**0.71**	**14.8**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(7) FIFTH AVENUE & 45th STREET														
Fifth Avenue	SB	TR	0.86	15.1	C	TR	0.86	14.8	B			n/a		
45th Street	WB	LT	1.05	66.0	F	LT	1.05	120.0+	*F**					
Overall Intersection		-	**0.96**	**23.2**	**C**	-	**0.95**	**120.0+**	**F***					
(8) FIFTH AVENUE & 44th STREET														
Fifth Avenue	SB	LT	0.83	14.3	B	LT	0.82	14.1	B			n/a		
44th Street	EB	TR	0.50	13.0	B	TR	0.52	13.2	B					
Overall Intersection		-	**0.66**	**14.0**	**B**	-	**0.67**	**14.0**	**B**					
(9) FIFTH AVENUE & 43rd STREET														
Fifth Avenue	SB	TR	0.88	15.6	C	TR	0.86	15.1	C			n/a		
43rd Street	WB	LT	1.10	120.0+	*F**	LT	1.12	120.0+	*F**					
Overall Intersection		-	**0.99**	**120.0+**	**F***	-	**0.99**	**120.0+**	**F***					
(10) FIFTH AVENUE & 42nd STREET														
Fifth Avenue	SB	LTR	0.72	13.1	B	LTR	0.70	12.8	B					
42nd Street	EB	TR	0.88	25.5	D	TR	0.86	24.2	C			n/a		
42nd Street	WB	LT	1.05	55.4	E	LT	1.04	54.1	E					
Overall Intersection		-	**0.86**	**26.1**	**D**	-	**0.85**	**25.5**	**D**					
(11) FIFTH AVENUE & 41st STREET														
Fifth Avenue	SB	LT	0.67	6.0	B	LT	0.66	5.9	B			n/a		
Overall Intersection		-	**0.41**	**6.0**	**B**	-	**0.40**	**5.9**	**B**					
(12) FIFTH AVENUE & 40th STREET														
Fifth Avenue	SB	LT	0.68	9.2	B	LT	0.67	9.1	B			n/a		
40th Street	EB	TR	0.56	16.0	C	TR	0.56	16.0	C					
Overall Intersection		-	**0.63**	**10.7**	**B**	-	**0.62**	**10.6**	**B**					
(13) MADISON AVENUE & 40th STREET														
Madison Avenue	NB	TR	0.96	22.2	C	TR	0.96	22.7	C			n/a		
40th Street	EB	LT	0.48	12.8	B	LT	0.48	12.8	B					
Overall Intersection		-	**0.72**	**20.1**	**C**	-	**0.72**	**20.4**	**C**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(14) MADISON AVENUE & 41st STREET														
Madison Avenue	NB	TR	0.95	21.2	C	TR	0.96	21.6	C			n/a		
41st Street	EB	LT	0.59	15.3	C	LT	0.63	16.4	C					
Overall Intersection		-	**0.77**	**20.5**	**C**	-	**0.79**	**21.0**	**C**					
(15) MADISON AVENUE & 42nd STREET														
Madison Avenue	NB	LTR	0.95	25.9	D	LTR	0.95	25.6	D					
42nd Street	EB	LT	1.11	120.0+	*F**	LT	1.08	120.0+	*F**			n/a		
42nd Street	WB	T	0.79	18.0	C	T	0.79	18.0	C					
Overall Intersection		-	**0.87**	**120.0+**	**F***	-	**0.87**	**120.0+**	**F***					
(16) MADISON AVENUE & 43rd STREET														
Madison Avenue	NB	LT	0.66	11.8	B	LT	0.66	11.8	B			n/a		
43rd Street	WB	TR	0.41	12.2	B	TR	0.45	12.5	B					
Overall Intersection		-	**0.54**	**11.9**	**B**	-	**0.55**	**11.9**	**B**					
(17) MADISON AVENUE & 44th STREET														
Madison Avenue	NB	TR	0.59	11.1	B	TR	0.60	11.2	B			n/a		
44th Street	EB	LT	0.73	18.1	C	LT	0.70	17.2	C					
Overall Intersection		-	**0.66**	**12.5**	**B**	-	**0.65**	**12.4**	**B**					
(18) MADISON AVENUE & 45th STREET														
Madison Avenue	NB	LT	0.69	12.1	B	LT	0.69	12.1	B			n/a		
45th Street	WB	TR	1.00	50.4	E	TR	1.03	58.7	*E*					
Overall Intersection		-	**0.84**	**19.5**	**C**	-	**0.86**	**21.2**	**C**					
(19) MADISON AVENUE & 46th STREET														
Madison Avenue	NB	TR	0.69	12.1	B	TR	0.70	12.2	B			n/a		
46th Street	EB	LT	0.97	40.8	E	LT	0.97	42.5	*E*					
Overall Intersection		-	**0.83**	**18.3**	**C**	-	**0.84**	**18.7**	**C**					
(20) MADISON AVENUE & 47th STREET														
Madison Avenue	NB	LT	0.67	11.8	B	LT	0.68	12.0	B			n/a		
47th Street	WB	TR	0.58	13.9	B	TR	0.61	14.3	B					
Overall Intersection		-	**0.63**	**12.4**	**B**	-	**0.65**	**12.7**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(21) MADISON AVENUE & 48th STREET														
Madison Avenue	NB	TR	0.70	12.2	B	TR	0.75	12.9	B			n/a		
48th Street	EB	LT	0.57	13.8	B	LT	0.64	14.8	B					
Overall Intersection		-	**0.64**	**12.6**	**B**	-	**0.70**	**13.4**	**B**					
(22) VANDERBILT AVENUE & 47th STREET														
Vanderbilt Avenue	NB	L	0.12	12.5	B	L	0.12	12.5	B			n/a		
47th Street	WB	LT	0.77	15.2	C	LT	0.78	15.4	C					
Overall Intersection		-	**0.49**	**15.1**	**C**	-	**0.49**	**15.3**	**C**					
(23) VANDERBILT AVENUE & 46th STREET														
Vanderbilt Avenue	NB	TR	0.78	23.8	C	TR	0.81	26.8	D					
Vanderbilt Avenue	SB	LT	0.37	11.9	B	LT	0.37	11.9	B			n/a		
46th Street	EB	LTR	0.43	12.3	B	LTR	0.43	12.3	B					
Overall Intersection		-	**0.61**	**14.7**	**B**	-	**0.62**	**15.4**	**C**					
(24) VANDERBILT AVENUE & 45th STREET														
Vanderbilt Avenue	NB	LT	0.30	11.4	B	LT	0.31	11.4	B					
Vanderbilt Avenue	SB	TR	0.53	13.7	B	TR	0.53	13.7	B			n/a		
45th Street	WB	LTR	0.39	12.0	B	LTR	0.40	12.1	B					
Overall Intersection		-	**0.46**	**12.4**	**B**	-	**0.47**	**12.5**	**B**					
(27) VANDERBILT AVENUE & 42nd STREET														
42nd Street	EB	LT	0.81	19.2	C	LT	0.80	18.7	C			n/a		
42nd Street	WB	TR	0.88	22.1	C	TR	0.89	22.5	C					
Overall Intersection		-	**0.43**	**20.8**	**C**	-	**0.43**	**20.8**	**C**					
(28) PARK AVENUE & 40th STREET														
Park Avenue	NB	TR	0.52	9.0	B	TR	0.53	9.1	B					
Park Avenue	SB	T	0.30	7.4	B	T	0.30	7.4	B					
Park Avenue (tunnel)	NB	T	0.64	10.6	B	T	0.64	10.6	B			n/a		
Park Avenue (viaduct)	SB	T	0.56	9.3	B	T	0.55	9.2	B					
40th Street	EB	LTR	0.80	26.2	D	LTR	0.80	26.2	D					
		R	0.56	21.1	C	R	0.56	21.1	C					
Overall Intersection		-	**0.70**	**11.7**	**B**	-	**1.77**	**11.1**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(29) PARK AVENUE(SB) & 41st STREET														
Park Avenue	SB	LT	0.28	7.7	B	LT	0.28	7.7	B			n/a		
41st Street	EB	TR	0.59	19.7	C	TR	0.59	19.7	C					
Overall Intersection		-	**0.40**	**13.6**	**B**	-	**0.40**	**13.6**	**B**					
(30) PARK AVENUE(NB) & 41st STREET														
Park Avenue	NB	TR	0.29	7.7	B	TR	0.31	7.8	B			n/a		
41st Street	EB	LT	0.42	16.7	C	LT	0.42	16.7	C					
Overall Intersection		-	**0.34**	**10.4**	**B**	-	**0.35**	**10.5**	**B**					
(31) PARK AVENUE & 42nd STREET														
Park Avenue	NB	LR	0.37	15.8	C	LR	0.40	16.2	C	L	0.07	14.5	B	-Remove parking along the NB approach
		R	1.20+	120+	*F**	R	1.20	120+	*F**	R	0.64	21.0	C	to provide two right-turn lanes and one
42nd Street	EB	T	0.55	15.3	C	T	0.53	15.1	C	T	0.51	13.9	B	left lane, adjust the signal timing to
		R	1.20+	120+	*F**	R	1.20	120+	*F**	R	1.20+	120+	*F**	provide a protected NB phase, and shift
42nd Street	WB	LT	0.72	12.4	B	LT	0.74	12.9	B	LT	0.71	11.5	B	2 seconds of green time from the NB phase to the E/W phase.
Overall Intersection		-	**1.20+**	**120+**	**F***	-	**1.20+**	**120+**	**F***	-	**1.20+**	**120+**	**F***	
(32) PARK AVENUE & 46th STREET														
Park Avenue	NB	TR	0.99	35.3	D	TR	0.99	28.8	D					
Park Avenue	SB	L	1.20+	120+	*F**	L	1.19	120+	*F**					
		T	0.90	23.3	C	T	0.89	22.2	C			n/a		
46th Street	EB	LTR	0.66	14.6	B	LTR	0.66	14.6	B					
Overall Intersection		-	**1.20+**	**120+**	**F***	-	**0.96**	**120+**	**F***					
(33) PARK AVENUE & 47th STREET														
Park Avenue	NB	DFL	0.99	87.5	F	DFL	0.99	87.5	F					
		T	0.85	10.2	B	T	0.82	9.4	B					
Park Avenue	SB	TR	0.78	8.4	B	TR	0.79	8.5	B			n/a		
47th Street	WB	LTR	0.82	24.0	C	LTR	0.82	24.1	C					
Overall Intersection		-	**0.97**	**13.3**	**B**	-	**0.97**	**13.1**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(34) PARK AVENUE & 48th STREET														
Park Avenue	NB	TR	0.66	7.0	B	TR	0.65	6.9	B	TR	0.65	6.9	B	-Provide a protected N/S phase and
Park Avenue	SB	DFL	0.85	48.5	E	DFL	0.93	67.0	F	LT	0.64	6.8	B	daylight the south curb of the EB
		T	0.90	12.2	B	T	0.89	11.9	B	-	-	-	-	approach.
48th Street	EB	LTR	0.97	40.6	E	LTR	1.03	56.5	E	LTR	0.97	39.8	D	
Overall Intersection		-	**0.93**	**15.4**	**C**	-	**1.00**	**19.0**	**C**	-	**0.77**	**12.7**	**B**	
(35) LEXINGTON AVENUE & 48th STREET														
Lexington Avenue	SB	LT	0.92	18.1	C	LT	0.92	18.0	C			n/a		
48th Street	EB	TR	0.52	13.2	B	TR	0.56	13.6	B					
Overall Intersection		-	**0.72**	**16.9**	**C**	-	**0.74**	**16.9**	**C**					
(36) LEXINGTON AVENUE & 47th STREET														
Lexington Avenue	SB	TR	0.98	24.3	C	TR	0.98	24.3	C			n/a		
47th Street	WB	LT	0.99	41.4	E	LT	1.01	46.7	E					
Overall Intersection		-	**0.98**	**28.9**	**D**	-	**0.99**	**30.3**	**D**					
(37) LEXINGTON AVENUE & 46th STREET														
Lexington Avenue	SB	LT	0.89	16.5	C	LT	0.89	16.6	C			n/a		
46th Street	EB	TR	1.01	48.6	E	TR	1.03	54.0	E					
Overall Intersection		-	**0.95**	**25.0**	**C**	-	**0.96**	**26.6**	**D**					
(38) LEXINGTON AVENUE & 45th STREET														
Lexington Avenue	SB	TR	1.12	83.8	*F**	TR	1.12	82.3	*F**			n/a		
45th Street	WB	LT	0.95	38.9	D	LT	0.42	12.2	B					
Overall Intersection		-	**0.97**	**74.7**	**F***	-	**0.70**	**67.4**	**F***					
(39) LEXINGTON AVENUE & 44th STREET														
Lexington Avenue	SB	LT	1.12	81.3	*F**	LT	1.12	81.3	*F**			n/a		
Overall Intersection		-	**0.48**	**81.3**	**F***	-	**0.48**	**81.3**	**F***					
(40) LEXINGTON AVENUE & 43rd STREET														
Lexington Avenue	SB	T	0.74	10.6	B	T	0.74	10.6	B	T	0.74	10.6	B	-Provide a protected WB signal phase.
43rd Street	WB	L	0.92	48.0	E	L	1.20+	120+	*F**	L	0.56	18.6	C	
Overall Intersection		-	**0.77**	**15.0**	**B**	-	**1.20+**	**120+**	**F***	-	**0.62**	**11.5**	**B**	
(41) LEXINGTON AVENUE & 42nd STREET														

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
Lexington Avenue	SB	LTR	1.00	33.6	D	LTR	1.01	34.5	D					
42nd Street	EB	TR	0.95	33.5	D	TR	0.92	29.2	D			n/a		
42nd Street	WB	LT	0.88	25.3	D	LT	0.88	24.7	C					
Overall Intersection		-	**0.98**	**31.5**	**D**	-	**0.97**	**30.8**	**D**					
(42) LEXINGTON AVENUE & 41st STREET														
Lexington Avenue	SB	LT	0.78	10.6	B	LT	0.77	10.5	B			n/a		
41st Street	EB	TR	0.75	23.4	C	TR	0.76	23.9	C					
Overall Intersection		-	**0.77**	**12.3**	**B**	-	**0.76**	**12.2**	**B**					
(43) LEXINGTON AVENUE & 40th STREET														
Lexington Avenue	SB	LT	0.73	7.8	B	LT	0.73	7.7	B			n/a		
40th Street	EB	TR	0.61	18.6	C	TR	0.61	18.6	C					
Overall Intersection		-	**0.68**	**10.2**	**B**	-	**0.68**	**10.1**	**B**					
(44) THIRD AVENUE & 40th STREET														
Third Avenue	NB	TR	0.72	7.4	B	TR	0.72	7.4	B			n/a		
40th Street	EB	LT	0.57	18.2	C	LT	0.57	18.3	C					
Overall Intersection		-	**0.66**	**8.7**	**B**	-	**0.66**	**8.7**	**B**					
(45) THIRD AVENUE & 41st STREET														
Third Avenue	NB	TR	0.74	7.6	B	TR	0.73	7.5	B					
41st Street	EB	LT	0.56	18.6	C	LT	0.56	18.6	C			n/a		
41st Street	WB	R	0.69	25.5	D	R	0.73	28.5	D					
Overall Intersection		-	**0.72**	**9.0**	**B**	-	**0.73**	**9.1**	**B**					
(46) THIRD AVENUE & 42nd STREET														
Third Avenue	NB	LT	0.95	23.3	C	LT	0.96	24.4	C	LT	1.01	34.1	D	-Provide a protected NB signal phase,
		R	1.14	120+	*F**	R	1.19	120+	*F**	R	0.96	51.9	E	shift 3 seconds of green time from the NB
42nd Street	EB	LT	0.87	22.5	C	LT	0.86	21.6	C	LT	0.80	17.4	C	phase to the E/W phase and daylight the
42nd Street	WB	T	0.59	20.6	C	T	0.59	20.6	C	T	0.53	18.4	C	west curb of the NB approach.
		R	1.06	101.7	*F**	R	1.16	120+	*F**	R	1.05	96.4	F	
Overall Intersection		-	**1.00**	**120+**	**F***	-	**1.03**	**120+**	**F***	-	**0.90**	**32.3**	**D**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(47) THIRD AVENUE & 43rd STREET														
Third Avenue	NB	LT	0.78	8.0	B	LT	0.77	7.9	B	LT	0.82	10.3	B	-Shift 3 seconds of green time from the NB
43rd Street	WB	TR	0.99	57.3	E	TR	1.05	77.9	F	TR	0.96	49.7	E	phase to the WB phase.
Overall Intersection		-	**0.86**	**12.5**	**B**	-	**0.88**	**14.4**	**B**	-	**0.88**	**13.9**	**B**	
(48) THIRD AVENUE & 44th STREET														
Third Avenue	NB	TR	0.83	8.7	B	TR	0.82	8.5	B			n/a		
44th Street	EB	LT	0.75	26.6	D	LT	0.76	26.7	D					
Overall Intersection		-	**0.80**	**9.8**	**B**	-	**0.79**	**9.7**	**B**					
(49) THIRD AVENUE & 45th STREET														
Third Avenue	NB	LT	0.80	8.2	B	LT	0.79	8.1	B			n/a		
45th Street	WB	TR	0.99	55.9	E	TR	1.01	60.4	F					
Overall Intersection		-	**0.87**	**13.4**	**B**	-	**0.88**	**13.9**	**B**					
(50) THIRD AVENUE & 46th STREET														
Third Avenue	NB	TR	0.90	15.7	C	TR	0.89	15.4	C			n/a		
46th Street	EB	LT	0.49	12.9	B	LT	0.50	13.0	B					
Overall Intersection		-	**0.69**	**15.2**	**C**	-	**0.70**	**15.0**	**B**					
(51) THIRD AVENUE & 47th STREET														
Third Avenue	NB	LT	0.90	15.5	C	LT	0.88	15.3	C			n/a		
47th Street	WB	TR	1.08	76.3	*F**	TR	1.08	76.8	*F**					
Overall Intersection		-	**0.98**	**24.7**	**F***	-	**0.98**	**24.7**	**F***					
(52) THIRD AVENUE & 48th STREET														
Third Avenue	NB	TR	0.86	14.8	B	TR	0.86	14.6	B	TR	0.86	14.6	B	-Daylight the north curb to provide a
48th Street	EB	LT	1.05	65.1	F	LT	1.12	96.1	*F**	L	0.92	42.7	E	left-turn lane eastbound.
										T	0.40	12.2	B	
Overall Intersection		-	**0.96**	**21.9**	**C**	-	**0.99**	**26.9**	**F***	-	**0.89**	**16.4**	**C**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(53) SECOND AVENUE & 42nd STREET														
Second Avenue	SB	LTR	0.92	18.2	C	LTR	0.91	18.1	C					
42nd Street	EB	TR	0.79	20.7	C	TR	0.80	21.1	C			n/a		
42nd Street	WB	LT	0.86	26.0	D	LT	0.86	26.5	D					
Overall Intersection		-	**0.89**	**19.6**	C	-	**0.89**	**19.7**	C					
(54) FIRST AVENUE & 42nd STREET														
First Avenue	NB	LTR	0.24	10.9	B	LTR	0.24	10.9	B					
42nd Street	EB	L	0.96	46.2	E	L	0.96	46.2	E					
		T	0.81	22.0	C	T	0.81	22.0	C			n/a		
42nd Street	WB	T	0.31	15.5	C	T	0.31	15.5	C					
		R	0.86	32.6	D	R	0.88	34.5	D					
Overall Intersection			**0.61**	**24.6**	C		**0.61**	**24.9**	C					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET												
44th Street	EB	L	6.5	0.5	B	L	6.6	0.5	B		n/a	
		R	3.3	0.2	A	R	3.3	0.3	A			
(26) VANDERBILT AVENUE & 43rd STREET												
Vanderbilt Avenue	NB	L	2.9	0.2	A	L	3.0	0.3	A		n/a	
43rd Street	WB	TR	5.7	0.7	B	TR	6.1	0.9	B			

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping.
refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that
cto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left
es change in different time periods. For example, a very heavy right-turn volume
may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(1) SEVENTH AVENUE & 42nd STREET														
Seventh Avenue	SB	LTR	0.81	14.5	B	LTR	0.77	13.6	B					
42nd Street	EB	TR	0.80	22.0	C	TR	0.72	19.5	C			n/a		
42nd Street	WB	LT	0.90	28.4	D	LT	0.87	25.4	D					
Overall Intersection		-	**0.85**	**18.7**	**C**	-	**0.81**	**17.1**	**C**					
(2) BROADWAY & 42nd STREET														
Broadway	SB	LTR	0.67	13.1	B	LTR	0.65	12.8	B					
42nd Street	EB	TR	0.56	15.5	C	TR	0.48	14.6	B			n/a		
42nd Street	WB	LT	1.20+	120+	*F**	LT	1.18	120+	*F**					
		-	-	-	-	-	-	-	-					
Overall Intersection		-	**1.20+**	**120+**	**F***	-	**0.89**	**120+**	**F***					
(3) SIXTH AVENUE & 42nd STREET														
Sixth Avenue	NB	LTR	1.08	57.8	F*	LTR	1.03	35.9	D	LTR	1.05	43.5	E	-Shift 1 second of green time from
		R	0.47	11.3	B	R	0.66	16.5	C	R	0.68	17.6	C	the NB phase to the E/W phase.
42nd Street	EB	LT	0.79	20.9	C	LT	0.71	18.4	C	LT	0.69	17.6	C	
42nd Street	WB	TR	0.74	19.0	C	TR	0.73	18.8	C	TR	0.71	17.9	C	
		R	1.16	120+	*F**	R	1.19	120+	*F**	R	1.16	120+	*F**	
Overall Intersection		-	**1.12**	**120+**	**F***	-	**1.10**	**120+**	**F***	-	**1.10**	**120+**	**F***	
(4) FIFTH AVENUE & 48th STREET														
Fifth Avenue	SB	LT	0.72	9.6	B	LT	0.74	10.0	B			n/a		
48th Street	EB	TR	0.82	21.7	C	TR	0.91	27.8	D					
Overall Intersection		-	**0.76**	**13.1**	**B**	-	**0.82**	**15.7**	**C**					
(5) FIFTH AVENUE & 47th STREET														
Fifth Avenue	SB	TR	0.69	9.3	B	TR	0.66	9.0	B			n/a		
47th Street	WB	LT	0.55	15.9	C	LT	0.58	16.2	C					
Overall Intersection		-	**0.63**	**10.7**	**B**	-	**0.62**	**10.6**	**B**					
(6) FIFTH AVENUE & 46th STREET														
Fifth Avenue	SB	LT	0.72	9.6	B	LT	0.69	9.3	B			n/a		
46th Street	EB	TR	0.65	17.3	C	TR	0.66	17.6	C					
Overall Intersection		-	**0.69**	**11.4**	**B**	-	**0.68**	**11.3**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(7) FIFTH AVENUE & 45th STREET														
Fifth Avenue	SB	TR	0.73	9.7	B	TR	0.70	9.4	B			n/a		
45th Street	WB	LT	0.55	15.8	C	LT	0.58	16.2	C					
Overall Intersection		-	**0.65**	**11.1**	**B**	-	**0.65**	**11.0**	**B**					
(8) FIFTH AVENUE & 44th STREET														
Fifth Avenue	SB	LT	0.72	9.7	B	LT	0.70	9.4	B			n/a		
44th Street	EB	TR	0.65	17.5	C	TR	0.69	18.2	C					
Overall Intersection		-	**0.69**	**11.3**	**B**	-	**0.69**	**11.4**	**B**					
(9) FIFTH AVENUE & 43rd STREET														
Fifth Avenue	SB	TR	0.77	10.3	B	TR	0.73	9.8	B			n/a		
43rd Street	WB	LT	0.49	15.2	C	LT	0.50	15.3	C					
Overall Intersection		-	**0.65**	**11.2**	**B**	-	**0.63**	**10.9**	**B**					
(10) FIFTH AVENUE & 42nd STREET														
Fifth Avenue	SB	LTR	0.68	12.5	B	LTR	0.64	12.1	B					
42nd Street	EB	TR	0.93	29.4	D	TR	0.84	23.1	C			n/a		
42nd Street	WB	LT	1.13	94.6	*F**	LT	1.09	74.8	*F**					
Overall Intersection		-	**0.88**	**37.4**	**F***	-	**0.84**	**31.4**	**F***					
(11) FIFTH AVENUE & 41st STREET														
Fifth Avenue	SB	LT	0.68	6.2	B	LT	0.66	6.0	B			n/a		
Overall Intersection		-	**0.42**	**6.2**	**B**	-	**0.40**	**6.0**	**B**					
(12) FIFTH AVENUE & 40th STREET														
Fifth Avenue	SB	LT	0.69	9.4	B	LT	0.66	9.0	B			n/a		
40th Street	EB	TR	0.74	19.3	C	TR	0.75	19.6	C					
Overall Intersection		-	**0.71**	**12.1**	**B**	-	**0.70**	**12.1**	**B**					
(13) MADISON AVENUE & 40th STREET														
Madison Avenue	NB	TR	0.90	14.3	B	TR	0.90	14.1	B			n/a		
40th Street	EB	LT	0.58	16.2	C	LT	0.58	16.2	C					
Overall Intersection		-	**0.76**	**14.8**	**B**	-	**0.76**	**14.7**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(14) MADISON AVENUE & 41st STREET														
Madison Avenue	NB	TR	0.86	12.7	B	TR	0.87	12.8	B			n/a		
41st Street	EB	LT	0.50	15.8	C	LT	0.52	16.1	C					
Overall Intersection		-	**0.70**	**13.0**	**B**	-	**0.71**	**13.2**	**B**					
(15) MADISON AVENUE & 42nd STREET														
Madison Avenue	NB	LTR	0.86	17.1	C	LTR	0.85	16.8	C					
42nd Street	EB	LT	1.03	51.1	E	LT	0.95	33.1	D			n/a		
42nd Street	WB	T	0.92	28.5	D	T	0.92	28.5	D					
Overall Intersection		-	**0.93**	**28.8**	**D**	-	**0.89**	**23.9**	**C**					
(16) MADISON AVENUE & 43rd STREET														
Madison Avenue	NB	LT	0.58	8.4	B	LT	0.57	8.3	B			n/a		
43rd Street	WB	TR	0.44	14.7	B	TR	0.56	16.0	C					
Overall Intersection		-	**0.52**	**9.7**	**B**	-	**0.56**	**10.1**	**B**					
(17) MADISON AVENUE & 44th STREET														
Madison Avenue	NB	TR	0.52	8.0	B	TR	0.53	8.0	B			n/a		
44th Street	EB	LT	0.62	17.0	C	LT	0.62	16.9	C					
Overall Intersection		-	**0.56**	**10.1**	**B**	-	**0.57**	**10.2**	**B**					
(18) MADISON AVENUE & 45th STREET														
Madison Avenue	NB	LT	0.64	8.9	B	LT	0.65	8.9	B			n/a		
45th Street	WB	TR	0.55	15.9	C	TR	0.57	16.1	C					
Overall Intersection		-	**0.60**	**10.6**	**B**	-	**0.61**	**10.7**	**B**					
(19) MADISON AVENUE & 46th STREET														
Madison Avenue	NB	TR	0.63	8.8	B	TR	0.64	8.9	B			n/a		
46th Street	EB	LT	0.69	18.1	C	LT	0.69	18.1	C					
Overall Intersection		-	**0.66**	**11.5**	**B**	-	**0.66**	**11.5**	**B**					
(20) MADISON AVENUE & 47th STREET														
Madison Avenue	NB	LT	0.57	8.3	B	LT	0.58	8.4	B			n/a		
47th Street	WB	TR	0.57	16.0	C	TR	0.68	17.8	C					
Overall Intersection		-	**0.57**	**10.4**	**B**	-	**0.62**	**11.1**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(21) MADISON AVENUE & 48th STREET														
Madison Avenue	NB	TR	0.58	8.3	B	TR	0.61	8.6	B			n/a		
48th Street	EB	LT	0.69	17.8	C	LT	0.84	22.6	C					
Overall Intersection		-	**0.62**	**11.2**	**B**	-	**0.71**	**13.3**	**B**					
(22) VANDERBILT AVENUE & 47th STREET														
Vanderbilt Avenue	NB	L	0.2	12.9	B	L	0.19	12.9	B			n/a		
47th Street	WB	LT	0.6	12.2	B	LT	0.65	12.6	B					
Overall Intersection		-	**0.43**	**12.3**	**B**	-	**0.45**	**12.7**	**B**					
(23) VANDERBILT AVENUE & 46th STREET														
Vanderbilt Avenue	NB	TR	0.44	12.6	B	TR	0.45	12.6	B					
Vanderbilt Avenue	SB	LT	0.32	11.5	B	LT	0.31	11.4	B			n/a		
46th Street	EB	LTR	0.54	13.4	B	LTR	0.54	13.4	B					
Overall Intersection		-	**0.49**	**12.8**	**B**	-	**0.50**	**12.9**	**B**					
(24) VANDERBILT AVENUE & 45th STREET														
Vanderbilt Avenue	NB	LT	0.37	11.9	B	LT	0.36	11.9	B					
Vanderbilt Avenue	SB	TR	0.37	12.0	B	TR	0.37	11.9	B			n/a		
45th Street	WB	LTR	0.94	33.9	D	LTR	0.96	38.4	D					
Overall Intersection		-	**0.66**	**23.6**	**C**	-	**0.66**	**26.3**	**D**					
(27) VANDERBILT AVENUE & 42nd STREET														
42nd Street	EB	LT	0.91	25.3	D	LT	0.85	20.8	C			n/a		
42nd Street	WB	TR	0.90	23.5	C	TR	0.91	24.2	C					
Overall Intersection		-	**0.44**	**24.3**	**C**	-	**0.44**	**22.8**	**C**					
(28) PARK AVENUE & 40th STREET														
Park Avenue	NB	TR	0.60	10.2	B	TR	0.61	10.4	B					
Park Avenue	SB	T	0.26	7.6	B	T	0.27	7.6	B					
Park Avenue (tunnel)	NB	T	0.60	10.5	B	T	0.59	10.3	B			n/a		
Park Avenue (viaduct)	SB	T	0.69	11.4	B	T	0.67	11.1	B					
40th Street	EB	LTR	1.06	120+	*F**	LTR	1.06	70.4	*F**					
		R	0.56	20.4	C	R	0.56	20.4	C					
Overall Intersection		-	**1.20+**	**120+**	**F***	-	**1.91**	**19.8**	**F***					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(29) PARK AVENUE(SB) & 41st STREET														
Park Avenue	SB	LT	0.25	7.5	B	LT	0.26	7.6	B			n/a		
41st Street	EB	TR	0.69	22.2	C	TR	0.68	21.8	C					
Overall Intersection		-	**0.42**	**16.0**	**C**	-	**0.43**	**15.6**	**C**					
(30) PARK AVENUE(NB) & 41st STREET														
Park Avenue	NB	TR	0.20	7.3	B	TR	0.22	7.3	B			n/a		
41st Street	EB	LT	0.65	20.7	C	LT	0.68	21.8	C					
Overall Intersection		-	**0.38**	**13.5**	**B**	-	**0.40**	**14.2**	**B**					
(31) PARK AVENUE & 42nd STREET														
Park Avenue	NB	LR	0.31	15.2	C	LR	0.33	15.3	C	L	0.16	15.1	C	-Remove parking along the NB approach
		R	0.98	80.2	F	R	1.20+	120+	*F**	R	0.49	18.1	C	to provide two right-turn lanes and one
42nd Street	EB	T	0.59	15.8	C	T	0.53	15.0	C	T	0.50	13.8	B	left lane, provide a protected NB phase,
		R	1.20+	120+	*F**	R	1.20+	120+	*F**	R	1.20+	120+	*F**	and shift 2 seconds of green time from the
42nd Street	WB	LT	0.70	12.1	B	LT	0.76	13.3	B	LT	0.73	11.8	B	NB phase to the E/W phase.
Overall Intersection		-	**1.20+**	**120+**	**F***	-	**1.20+**	**120+**	**F***	-	**1.20+**	**120+**	**F***	
(32) PARK AVENUE & 46th STREET														
Park Avenue	NB	TR	0.87	20.4	C	TR	0.85	19.7	C					
Park Avenue	SB	L	1.20+	120+	*F**	L	0.30	11.8	B					
		T	0.91	23.6	C	T	0.88	21.4	C			n/a		
46th Street	EB	LTR	0.60	13.5	B	LTR	0.60	13.5	B					
Overall Intersection		-	**1.20+**	**120+**	**F***	-	**0.74**	**18.2**	**C**					
(33) PARK AVENUE & 47th STREET														
Park Avenue	NB	DFL	0.85	48.5	E	DFL	0.99	87.5	F	LT	0.63	6.7	B	-Provide a protected N/S phase.
		T	0.90	12.1	B	T	0.88	11.2	B	-	-	-	-	
Park Avenue	SB	TR	0.80	8.7	B	TR	0.81	8.9	B	TR	0.80	8.6	B	
47th Street	WB	LTR	0.93	33.6	D	LTR	0.92	32.2	D	LTR	0.92	32.2	D	
Overall Intersection		-	**0.92**	**14.7**	**B**	-	**1.00**	**15.0**	**B**	-	**0.84**	**11.7**	**B**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(34) PARK AVENUE & 48th STREET														
Park Avenue	NB	TR	0.76	8.1	B	TR	0.76	8.0	B	TR	0.75	7.9	B	-Daylight the south curb of the eastbound
Park Avenue	SB	DFL	0.85	48.5	E	DFL	0.93	67.0	F	-	-	-	-	approach and provide a protected N/S
		T	0.98	20.0	C	T	0.96	16.5	C	LT	0.68	7.2	B	phase.
48th Street	EB	LTR	0.79	23.1	C	LTR	0.97	38.6	D	LTR	0.91	29.8	D	
Overall Intersection		-	**0.91**	**15.6**	**C**	-	**0.98**	**17.6**	**C**	-	**0.81**	**11.4**	**B**	
(35) LEXINGTON AVENUE & 48th STREET														
Lexington Avenue	SB	LT	0.80	8.7	B	LT	0.78	8.5	B			n/a		
48th Street	EB	TR	0.72	20.5	C	TR	0.85	25.4	D					
Overall Intersection		-	**0.77**	**11.9**	**B**	-	**0.81**	**13.7**	**B**					
(36) LEXINGTON AVENUE & 47th STREET														
Lexington Avenue	SB	TR	0.89	11.3	B	TR	0.89	11.4	B			n/a		
47th Street	WB	LT	0.64	19.0	C	LT	0.67	19.5	C					
Overall Intersection		-	**0.79**	**13.2**	**B**	-	**0.80**	**13.4**	**B**					
(37) LEXINGTON AVENUE & 46th STREET														
Lexington Avenue	SB	LT	0.73	7.8	B	LT	0.74	7.8	B			n/a		
46th Street	EB	TR	0.81	22.9	C	TR	0.80	22.6	C					
Overall Intersection		-	**0.76**	**12.8**	**B**	-	**0.76**	**12.6**	**B**					
(38) LEXINGTON AVENUE & 45th STREET														
Lexington Avenue	SB	TR	0.99	25.3	D	TR	0.99	25.8	D			n/a		
45th Street	WB	LT	0.69	20.3	C	LT	0.76	22.3	C					
Overall Intersection		-	**0.78**	**24.2**	**C**	-	**0.80**	**25.0**	**C**					
(39) LEXINGTON AVENUE & 44th STREET														
Lexington Avenue	SB	LT	1.04	40.2	E	LT	1.04	39.3	D			n/a		
Overall Intersection		-	**0.49**	**40.2**	**E**	-	**0.49**	**39.3**	**D**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(40) LEXINGTON AVENUE & 43rd STREET														
Lexington Avenue	SB	T	0.84	15.5	C	T	0.84	15.6	C	T	0.84	15.6	C	-Provide a protected WB phase.
43rd Street	WB	L	0.97	58.7	E	L	1.20+	120+	*F**	L	0.68	22.1	C	
Overall Intersection		-	**0.79**	**20.7**	**C**	-	**1.20+**	**120+**	**F***	-	**0.68**	**16.4**	**C**	
(41) LEXINGTON AVENUE & 42nd STREET														
Lexington Avenue	SB	LTR	1.03	41.2	E	LTR	1.04	41.7	E					
42nd Street	EB	TR	0.95	32.9	D	TR	0.82	21.9	C		n/a			
42nd Street	WB	LT	0.92	28.4	D	LT	0.88	25.2	D					
Overall Intersection		-	**1.00**	**36.1**	**D**	-	**0.97**	**33.1**	**D**					
(42) LEXINGTON AVENUE & 41st STREET														
Lexington Avenue	SB	LT	0.75	10.2	B	LT	0.72	9.8	B		n/a			
41st Street	EB	TR	0.75	22.9	C	TR	0.76	23.3	C					
Overall Intersection		-	**0.75**	**12.1**	**B**	-	**0.74**	**11.8**	**B**					
(43) LEXINGTON AVENUE & 40th STREET														
Lexington Avenue	SB	LT	0.69	7.3	B	LT	0.67	7.1	B		n/a			
40th Street	EB	TR	0.71	20.5	C	TR	0.70	20.1	C					
Overall Intersection		-	**0.70**	**11.0**	**B**	-	**0.68**	**10.8**	**B**					
(44) THIRD AVENUE & 40th STREET														
Third Avenue	NB	TR	0.66	6.8	B	TR	0.65	6.8	B		n/a			
40th Street	EB	LT	0.69	20.2	C	LT	0.68	20.0	C					
Overall Intersection		-	**0.67**	**9.1**	**B**	-	**0.66**	**9.0**	**B**					
(45) THIRD AVENUE & 41st STREET														
Third Avenue	NB	TR	0.66	6.8	B	TR	0.64	6.8	B	TR	0.64	6.8	B	-Daylight the north curb of the westbound
41st Street	EB	LT	0.57	18.7	C	LT	0.56	18.5	C	LT	0.56	18.5	C	approach.
41st Street	WB	R	0.89	46.7	E	R	0.99	74.3	F	R	0.87	43.1	E	
Overall Intersection		-	**0.75**	**9.9**	**B**	-	**0.78**	**11.2**	**B**	-	**0.73**	**9.6**	**B**	

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(46) THIRD AVENUE & 42nd STREET														
Third Avenue	NB	LT	0.87	18.3	C	LT	0.87	18.5	C	LT	0.87	18.5	C	-Provide a protect phase for the E/W
		R	0.76	24.9	C	R	0.82	31.3	D	R	0.82	31.3	D	movements.
42nd Street	EB	LT	0.97	34.4	D	LT	0.93	27.4	D	LT	0.93	27.4	D	
42nd Street	WB	T	0.67	21.8	C	T	0.66	21.7	C	T	0.66	21.7	C	
		R	1.16	120+	*F**	R	1.20+	120+	*F**	R	0.97	69.1	F	
Overall Intersection		-	**0.92**	**120+**	**F***	-	**1.20+**	**120+**	**F***	-	**0.90**	**22.9**	**C**	
(47) THIRD AVENUE & 43rd STREET														
Third Avenue	NB	LT	0.75	7.7	B	LT	0.74	7.5	B	LT	0.80	10.5	B	-Shift 4 seconds of green time from the NB
43rd Street	WB	TR	1.01	63.8	F	TR	1.20+	120+	F*	TR	1.02	63.7	F	phase to the WB phase.
Overall Intersection		-	**0.85**	**13.2**	**B**	-	**1.20+**	**120+**	**F***	-	**0.90**	**15.8**	**C**	
(48) THIRD AVENUE & 44th STREET														
Third Avenue	NB	TR	0.80	8.3	B	TR	0.78	8.0	B			n/a		
44th Street	EB	LT	0.57	19.1	C	LT	0.57	19.1	C					
Overall Intersection		-	**0.71**	**8.9**	**B**	-	**0.70**	**8.7**	**B**					
(49) THIRD AVENUE & 45th STREET														
Third Avenue	NB	LT	0.76	7.8	B	LT	0.75	7.7	B			n/a		
45th Street	WB	TR	0.97	47.4	E	TR	0.99	51.8	E					
Overall Intersection		-	**0.84**	**12.5**	**B**	-	**0.84**	**13.1**	**B**					
(50) THIRD AVENUE & 46th STREET														
Third Avenue	NB	TR	0.68	7.0	B	TR	0.66	6.9	B			n/a		
46th Street	EB	LT	0.76	21.3	C	LT	0.75	21.2	C					
Overall Intersection		-	**0.71**	**10.0**	**B**	-	**0.70**	**9.9**	**B**					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(51) THIRD AVENUE & 47th STREET														
Third Avenue	NB	LT	0.70	7.2	B	LT	0.69	7.1	B			n/a		
47th Street	WB	TR	1.12	120+	*F**	TR	1.10	95.0	*F**					
Overall Intersection		-	**0.87**	**120+**	**F***	-	**0.85**	**17.5**	**F***					
(52) THIRD AVENUE & 48th STREET														
Third Avenue	NB	TR	0.66	6.9	B	TR	0.65	6.8	B			n/a		
48th Street	EB	LT	0.71	20.5	C	LT	0.81	23.6	C					
Overall Intersection		-	**0.68**	**9.4**	**B**	-	**0.71**	**10.2**	**B**					
(53) SECOND AVENUE & 42nd STREET														
Second Avenue	SB	LTR	0.90	17.1	C	LTR	0.88	16.4	C					
42nd Street	EB	TR	0.82	21.7	C	TR	0.80	21.0	C			n/a		
42nd Street	WB	LT	0.94	35.0	D	LT	0.93	32.7	D					
Overall Intersection		-	**0.92**	**20.4**	**C**	-	**0.90**	**19.5**	**C**					
(54) FIRST AVENUE & 42nd STREET														
First Avenue	NB	LTR	0.23	10.9	B	LTR	0.23	10.9	B					
42nd Street	EB	L	1.06	75.3	*F**	L	1.02	67.0	F					
		T	0.88	28.4	D	T	0.86	26.4	D			n/a		
42nd Street	WB	T	0.40	16.2	C	T	0.40	16.2	C					
		R	1.11	96.6	*F**	R	1.12	102.6	*F**					
Overall Intersection		-	**0.67**	**43.2**	**F***	-	**0.66**	**42.5**	**F***					

Table M-3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	6.6	0.9	B	L	6.6	0.9	B		n/a		
		R	3.3	0.4	A	R	3.4	0.6	A				
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.8	0.1	A	L	2.8	0.2	A		n/a		
43rd Street	WB	TR	6.4	0.9	B	TR	7.2	1.2	B				

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping.
refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that
acto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left
ses change in different time periods. For example, a very heavy right-turn volume
may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

TABLE M-4

EXISTING
GCT EXTERNAL
PEDESTRIAN ANALYSES

Table M - 4
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
LEXINGTON AVENUE @ 42nd Street												
Northwest Corner	15.8	D			27.7	C			22.2	D		
North Crosswalk	30	C	13	E	41	B	19	D	27	C	12	E
West Crosswalk	30	C	14	E	33	C	16	D	30	C	15	E
LEXINGTON AVENUE between 43rd & 44th Street												
Crosswalk	22	D	11	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEXINGTON AVENUE @ 45th Street												
Southwest Corner	7.7	E			8.5	E			12.6	E		
South Crosswalk	45	B	26	C	38	C	17	D	45	B	25	C
West Crosswalk	32	C	14	E	32	C	14	E	32	C	13	E
MADISON AVENUE @ 43rd Street												
Northeast Corner	22.2	D			31.4	C			31.2	C		
North Crosswalk	41	B	21	D	96	B	45	B	45	B	22	D
East Crosswalk	52	B	15	D	36	C	11	E	60	B	18	D
Southeast Corner	22.1	D			29.1	C			33.6	C		
South Crosswalk	47	B	22	D	82	B	36	C	53	B	25	C
East Crosswalk	52	B	15	D	36	C	11	E	60	B	18	D
MADISON AVENUE @ 44th Street												
Northeast Corner	40.7	B			30.2	C			35.4	C		
North Crosswalk	58	B	33	C	87	B	45	B	55	B	30	C
East Crosswalk	67	B	21	D	31	C	10	E	55	B	17	D
Southeast Corner	26.6	C			17.5	D			28.7	C		
South Crosswalk	55	B	26	C	58	B	26	C	66	B	32	C
East Crosswalk	67	B	21	D	31	C	10	E	55	B	17	D
MADISON AVENUE @ 45th Street												
Northeast Corner	10.1	E			17.2	D			8.6	E		
North Crosswalk	32	C	17	D	52	B	25	C	39	C	20	D
East Crosswalk	47	B	15	D	47	B	16	D	36	C	12	E
Southeast Corner	18.9	D			27.0	C			20.5	D		
South Crosswalk	50	B	24	C	65	B	29	C	34	C	16	D
East Crosswalk	47	B	15	D	47	B	16	D	36	C	12	E
MADISON AVENUE @ 46th Street												
Northeast Corner	48	B			48.1	B			30.6	C		
North Crosswalk	103	B	53	B	148	A	71	B	98	B	51	B
East Crosswalk	47	B	14	E	39	C	12	E	30	C	9	E
Southeast Corner	20.9	D			32.8	C			28.3	C		
South Crosswalk	41	B	20	D	79	B	35	C	71	B	34	C
East Crosswalk	47	B	14	E	39	C	12	E	30	C	9	E
MADISON AVENUE @ 47th Street												
Northeast Corner	61.6	B			59.5	B			32.1	C		
North Crosswalk	93	B	48	B	169	A	83	B	79	B	42	B
East Crosswalk	75	B	20	D	48	B	13	E	36	C	9	E
Southeast Corner	33.4	C			27.7	C			24.3	C		
South Crosswalk	70	B	34	C	73	B	33	C	71	B	34	C
East Crosswalk	75	B	20	D	48	B	13	E	36	C	9	E
MADISON AVENUE @ 48th Street												
Northeast Corner	56.5	B			46.4	B			46.4	B		
North Crosswalk	54	B	27	C	81	B	40	C	83	B	43	B
East Crosswalk	83	B	27	C	45	B	16	D	53	B	16	D
Southeast Corner	114.8	B			78.6	B			82.8	B		
South Crosswalk	101	B	49	B	93	B	42	B	101	B	49	B
East Crosswalk	83	B	27	C	45	B	16	D	53	B	16	D

ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
VANDERBILT AVENUE @ 42nd Street												
Northeast Corner	19.6	D			33.5	C			21.9	D		
North Crosswalk	27	C	10	E	35	C	12	E	22	D	8	E
East Crosswalk	67	B	30	C	93	B	42	B	81	B	36	C
VANDERBILT AVENUE @ 44th Street												
Northwest Corner	53.3	B			52.6	B			49.7	B		
North Crosswalk	60	B	22	D	71	B	26	C	74	B	28	C
West Crosswalk	111	B	35	C	103	B	32	C	111	B	35	C
VANDERBILT AVENUE @ 45th Street												
Northwest Corner	31.5	C			17.2	D			24.0	C		
North Crosswalk	86	B	23	D	48	B	12	E	67	B	18	D
West Crosswalk	77	B	34	C	82	B	31	C	99	B	36	C
Southwest Corner	43.4	B			26.5	C			34.8	C		
South Crosswalk	98	B	25	C	44	B	11	E	57	B	15	E
West Crosswalk	77	B	34	C	82	B	31	C	99	B	36	C
Southeast Corner	49.1	B			25.9	C			31.6	C		
South Crosswalk	98	B	25	C	44	B	11	E	57	B	15	E
East Crosswalk	66	B	23	D	71	B	24	C	74	B	25	C
VANDERBILT AVENUE @ 46th Street												
Northeast Corner	54.5	B			32.1	C			41.6	B		
North Crosswalk	125	B	45	B	90	B	32	C	118	B	42	B
East Crosswalk	90	B	29	C	55	B	18	D	69	B	25	C
Southeast Corner	52.1	B			28.7	C			49.9	B		
South Crosswalk	147	A	56	B	66	B	24	D	118	B	42	B
East Crosswalk	90	B	29	C	55	B	18	D	69	B	25	C
Northwest Corner	54.4	B			41.7	B			45.3	B		
North Crosswalk	125	B	45	B	90	B	32	C	118	B	42	B
West Crosswalk	113	B	31	C	104	B	28	C	98	B	27	C
Southwest Corner	61.2	B			38.7	C			54.7	B		
South Crosswalk	147	A	56	B	66	B	24	D	118	B	42	B
West Crosswalk	113	B	31	C	104	B	28	C	98	B	27	C
VANDERBILT AVENUE @ 47th Street												
Southwest Corner	33.1	C			42.2	B			40.3	B		
South Crosswalk	80	B	32	C	84	B	33	C	82	B	31	C
West Crosswalk	83	B	25	C	116	B	35	C	104	B	31	C
PARK AVENUE @ 48th Street												
Northeast Corner	44.9	B			55.3	B			43.0	B		
North Crosswalk	82	B	78	B	58	B	56	B	63	B	59	B
East Crosswalk	35	C	12	E	73	B	22	D	43	B	14	E
Southwest Corner	76.4	B			81.1	B			107.5	B		
South Crosswalk	72	B	68	B	84	B	80	B	101	B	94	B
West Crosswalk	117	B	29	C	115	B	29	C	158	A	40	C
PARK AVENUE @ 42nd Street												
East Crosswalk	37	C	23	D	49	B	31	C	61	B	36	C
West Crosswalk	49	B	28	C	62	B	35	C	41	B	24	D

Table M - 4
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	AM Peak Period				Mid-Day Peak Period				PM Peak Period			
	Average		Platoon		Average		Platoon		Average		Platoon	
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS
LEXINGTON AVENUE between 43rd & 44th Street												
Walkway	15.1	E	19.1	E	8.7	C	12.7	D	14.2	D	18.2	E
MADISON AVENUE between 43rd & 44th Street												
Walkway	3.7	B	7.7	C	3.4	B	7.4	C	4.6	B	8.6	C
MADISON AVENUE between 44rd & 45th Street												
Walkway	2.9	B	6.9	B	4.7	B	8.7	C	5.3	B	9.3	C
MADISON AVENUE between 45th & 46th Street												
Walkway	7.5	C	11.5	D	4.5	B	8.5	C	8.0	C	12.0	D
MADISON AVENUE between 46th & 47th Street												
Walkway	4.6	B	8.6	C	3.9	B	7.9	C	6.8	B	10.8	D
MADISON AVENUE between 47th & 48th Street												
Walkway	3.2	B	7.2	C	4.1	B	8.1	C	4.4	B	8.4	C
VANDERBILT AVENUE between 45th & 46th Street												
Walkway (East Side)	2.6	B	6.6	B	2.7	B	6.7	B	3.3	B	7.3	C
Walkway (West Side)	1.9	A	5.9	B	1.8	A	5.8	B	2.1	B	6.1	B
VANDERBILT AVENUE between 46th & 47th Street												
Walkway (East Side)	1.7	A	5.7	B	1.8	A	5.8	B	2.1	B	6.1	B
Walkway (West Side)	2.0	A	6.0	B	1.2	A	5.2	B	1.3	A	5.3	B
43rd STREET between Madison & Vanderbilt Avenue												
Walkway (North Side)	11.7	D	15.7	E	4.7	B	8.7	C	9.4	C	13.4	D
Walkway (South Side)	5.0	B	9.0	C	3.0	B	7.0	B	3.4	B	7.4	C
45th STREET between Madison & Vanderbilt Avenue												
Walkway (North side)	4.0	B	8.0	C	4.2	B	8.2	C	4.2	B	8.2	C
Walkway (South side)	9.9	C	13.9	D	7.0	C	11.0	D	15.1	E	19.1	E
46th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	1.2	A	5.2	B	1.0	A	5.0	B
Walkway (South Side)	1.3	A	5.3	B	1.6	A	5.6	B	1.5	A	5.5	B
47th STREET between Park & Lexington Avenue												
Walkway	0.7	A	4.7	B	0.8	A	4.8	B	0.7	A	4.7	B
47th STREET between Vanderbilt & Park Avenue												
Walkway (North Side)	1.6	A	5.6	B	1.7	A	5.7	B	1.9	A	5.9	B
Walkway (South Side)	1.0	A	5.0	B	1.3	A	5.3	B	1.3	A	5.3	B
47th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.0	A	5.0	B	0.8	A	4.8	B	1.2	A	5.2	B
Walkway (South Side)	1.7	A	5.7	B	2.0	B	6.0	B	1.8	A	5.8	B
48th STREET between Park & Lexington Avenue												
Walkway	1.6	A	5.6	B	1.3	A	5.3	B	1.4	A	5.4	B
48th STREET between Madison & Park Avenue												
Walkway	1.8	A	5.8	B	1.8	A	5.8	B	1.5	A	5.5	B

TABLE M-5

2010 NO BUILD
GCT EXTERNAL
PEDESTRIAN ANALYSES

Table M - 5
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
LEXINGTON AVENUE @ 42nd Street												
Northwest Corner	15.1	D			26.8	C			21.5	D		
North Crosswalk	29	C	13	E	40	B	18	D	27	C	12	E
West Crosswalk	29	C	14	E	32	C	16	D	29	C	14	E
LEXINGTON AVENUE between 43rd & 44th Street												
Crosswalk	22	D	11	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEXINGTON AVENUE @ 45th Street												
Southwest Corner	23.6	D			11.7	E			18.5	D		
South Crosswalk	62	B	37	C	40	C	19	D	61	B	34	C
West Crosswalk	63	B	27	C	42	B	19	D	54	B	23	D
MADISON AVENUE @ 43rd Street												
Northeast Corner	27.2	C			34.4	C			36.5	C		
North Crosswalk	46	B	23	D	131	A	61	B	58	B	29	C
East Crosswalk	51	B	15	E	35	C	11	E	59	B	17	D
Southeast Corner	21.2	D			28.3	C			32.6	C		
South Crosswalk	46	B	21	D	80	B	35	C	52	B	24	C
East Crosswalk	51	B	15	E	35	C	11	E	59	B	17	D
MADISON AVENUE @ 44th Street												
Northeast Corner	46.4	B			31.1	C			39.6	C		
North Crosswalk	57	B	33	C	86	B	44	B	53	B	29	C
East Crosswalk	96	B	30	C	33	C	11	E	68	B	21	D
Southeast Corner	33.6	C			18.1	D			32.0	C		
South Crosswalk	54	B	26	C	56	B	25	C	65	B	31	C
East Crosswalk	96	B	30	C	33	C	11	E	68	B	21	D
MADISON AVENUE @ 45th Street												
Northeast Corner	15.3	D			24.8	C			16.7	D		
North Crosswalk	32	C	17	D	62	B	30	C	38	C	20	D
East Crosswalk	111	B	36	C	62	B	21	D	55	B	18	D
Southeast Corner	62.0	B			37.4	C			30.1	C		
South Crosswalk	109	B	53	B	85	B	38	C	47	B	23	D
East Crosswalk	111	B	36	C	62	B	21	D	55	B	18	D
MADISON AVENUE @ 46th Street												
Northeast Corner	57.6	B			49.6	B			34.1	C		
North Crosswalk	98	B	52	B	148	A	71	B	95	B	49	B
East Crosswalk	84	B	25	C	48	B	15	E	39	C	12	E
Southeast Corner	35.8	C			38.8	C			36.0	C		
South Crosswalk	49	B	23	D	85	B	38	C	90	B	43	B
East Crosswalk	84	B	25	C	48	B	15	E	39	C	12	E
MADISON AVENUE @ 47th Street												
Northeast Corner	73.4	B			73.4	B			35.9	C		
North Crosswalk	90	B	47	B	169	A	83	B	77	B	41	B
East Crosswalk	127	B	33	C	54	B	15	E	42	B	11	E
Southeast Corner	49.7	B			30.3	C			27.5	C		
South Crosswalk	79	B	38	C	75	B	34	C	79	B	38	C
East Crosswalk	127	B	33	C	54	B	15	E	42	B	11	E
MADISON AVENUE @ 48th Street												
Northeast Corner	66.4	B			47.1	B			49.8	B		
North Crosswalk	51	B	27	C	78	B	38	C	80	B	41	B
East Crosswalk	105	B	34	C	47	B	16	D	58	B	17	D
Southeast Corner	137.5	A			80.5	B			89.0	B		
South Crosswalk	109	B	52	B	93	B	42	B	105	B	50	B
East Crosswalk	105	B	34	C	47	B	16	D	58	B	17	D

ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
VANDERBILT AVENUE @ 42nd Street												
Northeast Corner	18.8	D			32.1	C			21.1	D		
North Crosswalk	27	C	9	E	32	C	12	E	21	D	7	E
East Crosswalk	65	B	29	C	90	B	41	B	80	B	36	C
VANDERBILT AVENUE @ 44th Street												
Northwest Corner	51.5	B			51.0	B			47.9	B		
North Crosswalk	56	B	22	D	69	B	25	C	72	B	27	C
West Crosswalk	108	B	34	C	101	B	31	C	108	B	34	C
VANDERBILT AVENUE @ 45th Street												
Northwest Corner	31.5	C			16.8	D			23.5	D		
North Crosswalk	86	B	23	D	44	B	12	E	66	B	18	D
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southwest Corner	42.9	B			26.0	C			33.5	C		
South Crosswalk	95	B	24	C	41	B	11	E	55	B	14	E
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southeast Corner	47.7	B			25.1	C			30.8	C		
South Crosswalk	95	B	24	C	41	B	11	E	55	B	14	E
East Crosswalk	65	B	22	D	70	B	24	D	72	B	25	C
VANDERBILT AVENUE @ 46th Street												
Northeast Corner	53.8	B			31.0	C			40.3	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
East Crosswalk	88	B	28	C	53	B	18	D	68	B	25	C
Southeast Corner	51.2	B			27.6	C			49.3	B		
South Crosswalk	147	A	56	B	64	B	23	D	118	B	42	B
East Crosswalk	88	B	28	C	53	B	18	D	68	B	25	C
Northwest Corner	80.9	B			63.1	B			68.7	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
Southwest Corner	60.1	B			37.5	C			54.0	B		
South Crosswalk	147	A	56	B	64	B	23	D	118	B	42	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
VANDERBILT AVENUE @ 47th Street												
Southwest Corner	48.8	B			60.5	B			56.8	B		
South Crosswalk	77	B	31	C	79	B	32	C	79	B	30	C
West Crosswalk	77	B	24	C	116	B	35	C	100	B	30	C
PARK AVENUE @ 48th Street												
Northeast Corner	67.5	B			67.7	B			66.6	B		
North Crosswalk	80	B	76	B	55	B	54	B	61	B	58	B
East Crosswalk	65	B	21	D	116	B	35	C	80	B	25	C
Southwest Corner	73.6	B			78.0	B			104.1	B		
South Crosswalk	71	B	66	B	82	B	78	B	98	B	92	B
West Crosswalk	112	B	28	C	110	B	27	C	154	A	38	C
PARK AVENUE @ 42nd Street												
East Crosswalk	36	C	22	D	47	B	30	C	58	B	35	C
West Crosswalk	47	B	27	C	61	B	34	C	40	C	23	D

Table M - 5
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	AM Peak Period				Mid-Day Peak Period				PM Peak Period			
	Average		Platoon		Average		Platoon		Average		Platoon	
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS
LEXINGTON AVENUE between 43rd & 44th Street												
Walkway	12.1	D	16.1	E	7.5	C	11.5	D	11.7	D	15.7	E
MADISON AVENUE between 43rd & 44th Street												
Walkway	3.0	B	7.0	B	3.1	B	7.1	C	3.8	B	7.8	C
MADISON AVENUE between 44rd & 45th Street												
Walkway	2.1	B	6.1	B	4.4	B	8.4	C	4.3	B	8.3	C
MADISON AVENUE between 45th & 46th Street												
Walkway	5.2	B	9.2	C	3.5	B	7.5	C	4.7	B	8.7	C
MADISON AVENUE between 46th & 47th Street												
Walkway	3.1	B	7.1	C	3.3	B	7.3	C	5.6	B	9.6	C
MADISON AVENUE between 47th & 48th Street												
Walkway	2.4	B	6.4	B	3.9	B	7.9	C	3.8	B	7.8	C
VANDERBILT AVENUE between 45th & 46th Street												
Walkway (East Side)	2.6	B	6.6	B	2.7	B	6.7	B	3.4	B	7.4	C
Walkway (West Side)	2.0	A	6.0	B	1.8	A	5.8	B	2.1	B	6.1	B
VANDERBILT AVENUE between 46th & 47th Street												
Walkway (East Side)	1.8	A	5.8	B	1.8	A	5.8	B	2.1	B	6.1	B
Walkway (West Side)	2.0	B	6.0	B	1.2	A	5.2	B	1.3	A	5.3	B
43rd STREET between Madison & Vanderbilt Avenue												
Walkway (North Side)	8.5	C	12.5	D	3.3	B	7.3	C	6.7	B	10.7	D
Walkway (South Side)	5.2	B	9.2	C	3.1	B	7.1	C	3.5	B	7.5	C
45th STREET between Madison & Vanderbilt Avenue												
Walkway (North side)	4.2	B	8.2	C	4.3	B	8.3	C	4.3	B	8.3	C
Walkway (South side)	3.3	B	7.3	C	4.3	B	8.3	C	9.7	C	13.7	D
46th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	1.2	A	5.2	B	1.1	A	5.1	B
Walkway (South Side)	1.3	A	5.3	B	1.6	A	5.6	B	1.5	A	5.5	B
47th STREET between Park & Lexington Avenue												
Walkway	0.8	A	4.8	B	0.9	A	4.9	B	0.7	A	4.7	B
47th STREET between Vanderbilt & Park Avenue												
Walkway (North Side)	1.6	A	5.6	B	1.7	A	5.7	B	2.0	A	6.0	B
Walkway (South Side)	1.1	A	5.1	B	1.3	A	5.3	B	1.3	A	5.3	B
47th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	0.8	A	4.8	B	1.2	A	5.2	B
Walkway (South Side)	1.7	A	5.7	B	2.1	B	6.1	B	1.8	A	5.8	B
48th STREET between Park & Lexington Avenue												
Walkway	1.6	A	5.6	B	1.3	A	5.3	B	1.5	A	5.5	B
48th STREET between Madison & Park Avenue												
Walkway	1.8	A	5.8	B	1.8	A	5.8	B	1.6	A	5.6	B

TABLE M-6

2010 BUILD
GCT EXTERNAL
PEDESTRIAN ANALYSES

Table M - 6
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
LEXINGTON AVENUE @ 42nd Street												
Northwest Corner	12.8	E			25.4	C			20.2	D		
North Crosswalk	28	C	13	E	39	C	18	D	26	C	12	E
West Crosswalk	26	C	12	E	30	C	15	D	26	C	13	E
LEXINGTON AVENUE between 43rd & 44th Street												
Crosswalk	22	D	11	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEXINGTON AVENUE @ 45th Street												
Southwest Corner	19.3	D			11.1	E			16.3	D		
South Crosswalk	55	B	33	C	39	C	18	D	53	B	31	C
West Crosswalk	55	B	23	D	41	B	18	D	48	B	20	D
MADISON AVENUE @ 43rd Street												
Northeast Corner	15.6	D			28.0	C			25.5	C		
North Crosswalk	34	C	18	D	104	B	48	B	43	B	22	D
East Crosswalk	37	C	11	E	32	C	10	E	43	B	13	E
Southeast Corner	16.5	D			27.2	C			25.1	C		
South Crosswalk	41	B	19	D	86	B	37	C	47	B	22	D
East Crosswalk	37	C	11	E	32	C	10	E	43	B	13	E
MADISON AVENUE @ 44th Street												
Northeast Corner	30.9	C			26.5	C			29.8	C		
North Crosswalk	51	B	29	C	80	B	41	B	48	B	26	C
East Crosswalk	49	B	16	D	29	C	10	E	44	B	14	E
Southeast Corner	20.2	D			15.5	D			22.2	D		
South Crosswalk	47	B	23	D	53	B	24	D	56	B	27	C
East Crosswalk	49	B	16	D	29	C	10	E	44	B	14	E
MADISON AVENUE @ 45th Street												
Northeast Corner	11.1	E			20.4	D			12.4	E		
North Crosswalk	27	C	15	E	57	B	28	C	33	C	17	D
East Crosswalk	64	B	21	D	53	B	18	D	44	B	14	E
Southeast Corner	26.8	C			29.7	C			21.6	D		
South Crosswalk	66	B	32	C	73	B	33	C	38	C	18	D
East Crosswalk	64	B	21	D	53	B	18	D	42	B	14	E
MADISON AVENUE @ 46th Street												
Northeast Corner	42.0	B			43.7	B			27.5	C		
North Crosswalk	92	B	49	B	144	A	69	B	89	B	46	B
East Crosswalk	51	B	15	E	40	B	12	E	30	C	9	E
Southeast Corner	22.7	D			33.0	C			27.7	C		
South Crosswalk	41	B	20	D	76	B	34	C	70	B	34	C
East Crosswalk	51	B	15	E	40	B	12	E	30	C	9	E
MADISON AVENUE @ 47th Street												
Northeast Corner	32.1	C			49.7	B			25.6	C		
North Crosswalk	37	C	20	D	89	B	43	B	37	C	20	D
East Crosswalk	66	B	17	D	46	B	12	E	33	C	9	E
Southeast Corner	29.6	C			23.3	D			21.3	D		
South Crosswalk	61	B	29	C	69	B	31	C	64	B	31	C
East Crosswalk	66	B	17	D	46	B	12	E	33	C	9	E
MADISON AVENUE @ 48th Street												
Northeast Corner	20.9	D			26.1	C			16.3	D		
North Crosswalk	24	C	12	E	48	B	24	D	32	C	16	D
East Crosswalk	35	C	12	E	27	C	10	E	25	C	8	E
Southeast Corner	53.0	B			52.2	B			43.6	B		
South Crosswalk	66	B	32	C	78	B	35	C	69	B	33	C
East Crosswalk	35	C	12	E	27	C	10	E	25	C	8	E

ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
VANDERBILT AVENUE @ 42nd Street												
Northeast Corner	14.1	E			29.4	C			19.0	D		
North Crosswalk	23	D	9	E	32	C	11	E	19	D	7	E
East Crosswalk	52	B	23	D	80	B	36	C	63	B	28	C
VANDERBILT AVENUE @ 44th Street												
Northwest Corner	51.5	B			51.0	B			47.9	B		
North Crosswalk	56	B	22	D	69	B	25	C	72	B	27	C
West Crosswalk	108	B	34	C	101	B	31	C	108	B	34	C
VANDERBILT AVENUE @ 45th Street												
Northwest Corner	31.5	C			16.8	D			23.5	D		
North Crosswalk	86	B	23	D	44	B	12	E	66	B	18	D
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southwest Corner	42.4	B			26.0	C			33.2	C		
South Crosswalk	93	B	24	D	41	B	11	E	54	B	14	E
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southeast Corner	46.9	B			26.0	C			30.8	C		
South Crosswalk	93	B	24	D	41	B	11	E	54	B	14	E
East Crosswalk	61	B	21	D	67	B	23	D	67	B	23	D
VANDERBILT AVENUE @ 46th Street												
Northeast Corner	53.2	B			31.0	C			40.3	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
East Crosswalk	86	B	27	C	53	B	18	D	68	B	25	C
Southeast Corner	48.3	B			27.1	C			47.1	B		
South Crosswalk	147	A	56	B	64	B	23	D	114	B	41	B
East Crosswalk	86	B	27	C	53	B	18	D	68	B	25	C
Northwest Corner	80.9	B			63.1	B			68.7	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
Southwest Corner	55.6	B			37.5	C			53.2	B		
South Crosswalk	147	A	56	B	64	B	23	D	114	B	41	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
VANDERBILT AVENUE @ 47th Street												
Southwest Corner	48.8	B			60.5	B			56.8	B		
South Crosswalk	77	B	31	C	79	B	32	C	79	B	30	C
West Crosswalk	81	B	24	C	116	B	35	C	100	B	30	C
PARK AVENUE @ 48th Street												
Northeast Corner	30.6	C			44.4	B			33.5	C		
North Crosswalk	77	B	76	B	55	B	54	B	61	B	58	B
East Crosswalk	51	B	17	D	101	B	31	C	64	B	20	D
Southwest Corner	53.1	B			68.8	B			76.4	B		
South Crosswalk	70	B	62	B	82	B	78	B	96	B	92	B
West Crosswalk	69	B	17	D	90	B	22	D	90	B	22	D
PARK AVENUE @ 42nd Street												
East Crosswalk	34	C	21	D	46	B	29	C	53	B	33	C
West Crosswalk	44	B	25	C	58	B	33	C	38	C	22	D

Table M - 6
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	AM Peak Period				Mid-Day Peak Period				PM Peak Period			
	Average		Platoon		Average		Platoon		Average		Platoon	
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS
LEXINGTON AVENUE between 43rd & 44th Street												
Walkway	12.1	D	16.1	E	7.5	C	11.5	D	11.7	D	15.7	E
MADISON AVENUE between 43rd & 44th Street												
Walkway	4.3	B	8.3	C	3.6	B	7.6	C	5.3	B	9.3	C
MADISON AVENUE between 44rd & 45th Street												
Walkway	3.8	B	7.8	C	5.1	B	9.1	C	6.5	B	10.5	D
MADISON AVENUE between 45th & 46th Street												
Walkway	6.9	B	10.9	D	4.2	B	8.2	C	6.2	B	10.2	D
MADISON AVENUE between 46th & 47th Street												
Walkway	4.6	B	8.6	C	3.9	B	7.9	C	6.9	B	10.9	D
MADISON AVENUE between 47th & 48th Street												
Walkway	8.0	C	12.0	D	6.2	B	10.2	D	8.5	C	12.5	D
VANDERBILT AVENUE between 45th & 46th Street												
Walkway (East Side)	2.8	B	6.8	B	2.8	B	6.8	B	3.7	B	7.7	C
Walkway (West Side)	2.0	A	6.0	B	1.8	A	5.8	B	2.1	B	6.1	B
VANDERBILT AVENUE between 46th & 47th Street												
Walkway (East Side)	1.8	A	5.8	B	1.8	A	5.8	B	2.1	B	6.1	B
Walkway (West Side)	2.0	B	6.0	B	1.2	A	5.2	B	1.3	A	5.3	B
43rd STREET between Madison & Vanderbilt Avenue												
Walkway (North Side)	14.3	D	18.3	E	5.6	B	9.6	C	11.6	D	15.6	E
Walkway (South Side)	5.3	B	9.3	C	3.1	B	7.1	C	3.7	B	7.7	C
45th STREET between Madison & Vanderbilt Avenue												
Walkway (North side)	4.2	B	8.2	C	4.3	B	8.3	C	4.3	B	8.3	C
Walkway (South side)	8.2	C	12.2	D	6.2	B	10.2	D	13.8	D	17.8	E
46th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	1.2	A	5.2	B	1.1	A	5.1	B
Walkway (South Side)	1.3	A	5.3	B	1.6	A	5.6	B	1.5	A	5.5	B
47th STREET between Park & Lexington Avenue												
Walkway	2.3	B	6.3	B	1.5	A	5.5	B	1.9	A	5.9	B
47th STREET between Vanderbilt & Park Avenue												
Walkway (North Side)	1.6	A	5.6	B	1.7	A	5.7	B	2.0	A	6.0	B
Walkway (South Side)	1.1	A	5.1	B	1.3	A	5.3	B	1.3	A	5.3	B
47th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	0.8	A	4.8	B	1.2	A	5.2	B
Walkway (South Side)	1.7	A	5.7	B	2.1	B	6.1	B	1.8	A	5.8	B
48th STREET between Park & Lexington Avenue												
Walkway	1.6	A	5.6	B	1.3	A	5.3	B	1.5	A	5.5	B
48th STREET between Madison & Park Avenue												
Walkway	3.6	B	7.6	C	2.5	B	6.5	B	3.1	B	7.1	C

TABLE M-7

2010 MITIGATED BUILD GCT EXTERNAL PEDESTRIAN ANALYSES

Table M-7
ANALYSIS OF CORNERS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						COMMENTS
	8-9 AM Average		12-1 PM Average		5-6 PM Average		8-9 AM Average		12-1 PM Average		5-6 PM Average		
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	
LEXINGTON AVENUE @ 42nd Street													
Northwest Corner	12.8	E	25.4	C	20.2	D	19.7	D	34.4	C	27.1	C	Remove refuse cans & widen west crosswalk from 13 feet to 15 feet.
LEXINGTON AVENUE between 43rd & 44th Street													
Crosswalk	N/A	N/A	N/A	N/A	N/A	N/A							
LEXINGTON AVENUE @ 45th Street													
Southwest Corner	19.3	D	11.1	E	16.3	D							
MADISON AVENUE @ 43rd Street													
Northeast Corner	15.6	D	28.0	C	25.5	C							
Southeast Corner	16.5	D	27.2	C	25.1	C							
MADISON AVENUE @ 44th Street													
Northeast Corner	30.9	C	26.5	C	29.8	C							
Southeast Corner	20.2	D	15.5	D	22.2	D							
MADISON AVENUE @ 45th Street													
Northeast Corner	11.1	E	20.4	D	12.4	E	22.1	D	37.1	C	23.0	D	Widen East Crosswalk from 15.5 feet to 17 feet.
Southeast Corner	26.8	C	29.7	C	21.6	D							
MADISON AVENUE @ 46th Street													
Northeast Corner	42.0	B	43.7	B	27.5	C							
Southeast Corner	22.7	D	33.0	C	27.7	C							
MADISON AVENUE @ 47th Street													
Northeast Corner	32.1	C	49.7	B	25.6	C							
Southeast Corner	29.6	C	23.3	D	21.3	D							
MADISON AVENUE @ 48th Street													
Northeast Corner	20.9	D	26.1	C	16.3	D							
Southeast Corner	53.0	B	52.2	B	43.8	B							
VANDERBILT AVENUE @ 42nd Street													
Northeast Corner	14.1	E	29.4	C	19.0	D							
VANDERBILT AVENUE @ 44th Street													
Northwest Corner	51.5	B	51.0	B	47.9	B							
VANDERBILT AVENUE @ 45th Street													
Northwest Corner	31.5	C	16.8	D	23.5	D							
Southwest Corner	42.4	B	26.0	C	33.2	C							
Southeast Corner	46.9	B	26.0	C	30.8	C							
VANDERBILT AVENUE @ 46th Street													
Northeast Corner	53.2	B	31.0	C	40.3	B							
Southeast Corner	48.3	B	27.1	C	47.1	B							
Northwest Corner	80.9	B	63.1	B	68.7	B							
Southwest Corner	55.6	B	37.5	C	53.2	B							
VANDERBILT AVENUE @ 47th Street													
Northeast Corner	32.1	C	49.7	B	25.6	C							
Southeast Corner	29.6	C	23.3	D	21.3	D							
PARK AVENUE @ 48th Street													
Northeast Corner	30.6	C	44.4	B	33.5	C							
Southwest Corner	53.1	B	68.8	B	76.4	B							

Table M-7
ANALYSIS OF MID-BLOCK WALKWAYS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						
INTERSECTION and ELEMENT	8 - 9 AM Platoon		12 - 1 PM Platoon		5 - 6 PM Platoon		8 - 9 AM Platoon		12 - 1 PM Platoon		5 - 6 PM Platoon		COMMENTS
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	
LEXINGTON AVENUE between 43rd & 44th Street													
Walkway	16.1	E	11.5	D	15.7	E							
MADISON AVENUE between 43rd & 44th Street													
Walkway	8.3	C	7.6	C	9.3	C							
MADISON AVENUE between 44rd & 45th Street													
Walkway	7.8	C	9.1	C	10.5	D							
MADISON AVENUE between 45th & 46th Street													
Walkway	10.9	D	8.2	C	10.2	D							
MADISON AVENUE between 46th & 47th Street													
Walkway	8.6	C	7.9	C	10.9	D							
MADISON AVENUE between 47th & 48th Street													
Walkway	12.0	D	10.2	D	12.5	D							
VANDERBILT AVENUE between 45th & 46th Street													
Walkway (East Side)	6.8	B	6.8	B	7.7	C							
Walkway (West Side)	6.0	B	5.8	B	6.1	B							
VANDERBILT AVENUE between 46th & 47th Street													
Walkway (East Side)	5.8	B	5.8	B	6.1	B							
Walkway (West Side)	6.0	B	5.2	B	5.3	B							
43rd STREET between Madison & Vanderbilt Avenue													
Walkway (North Side)	18.3	E	9.6	C	15.6	E	11.1	D	6.8	B	9.8	C	Remove planters & Refuse cans Effective width = 8 feet
Walkway (South Side)	9.3	C	7.1	C	7.7	C							
45th STREET between Madison & Vanderbilt Avenue													
Walkway (North side)	8.2	C	8.3	C	8.3	C							
Walkway (South side)	12.2	D	10.2	D	17.8	E	8.9	C	7.7	C	12.3	D	Remove phone booths & Newspaper seller Effective width = 8 feet
46th STREET between Vanderbilt & Madison Avenue													
Walkway (North Side)	5.1	B	5.2	B	5.1	B							
Walkway (South Side)	5.3	B	5.6	B	5.5	B							
47th STREET between Park & Lexington Avenue													
Walkway	6.3	B	5.5	B	5.9	B							
47th STREET between Vanderbilt & Park Avenue													
Walkway (North Side)	5.6	B	5.7	B	6.0	B							
Walkway (South Side)	5.1	B	5.3	B	5.3	B							
47th STREET between Vanderbilt & Madison Avenue													
Walkway (North Side)	5.1	B	4.8	B	5.2	B							
Walkway (South Side)	5.7	B	6.1	B	5.8	B							
48th STREET between Park & Lexington Avenue													
Walkway	5.6	B	5.3	B	5.5	B							
48th STREET between Madison & Park Avenue													
Walkway	7.6	C	6.5	B	7.1	C							

Table M - 7
ANALYSIS OF CROSSWALKS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						COMMENTS
	8 - 9 AM Max Surge		12 - 1 PM Max Surge		5 - 6 PM Max Surge		8 - 9 AM Max Surge		12 - 1 PM Max Surge		5 - 6 PM Max Surge		
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	
LEXINGTON AVENUE @ 42nd Street													
North Crosswalk	13	E	18	D	12	E							
West Crosswalk	12.0	E	15	D	13.0	E	14	E	17	D	15	E	Remove rejuse cans & widen west crosswalk from 13 ft to 15 ft.
LEXINGTON AVENUE between 43rd & 44th Street													
Crosswalk	N/A	N/A	N/A	N/A	N/A	N/A							
LEXINGTON AVENUE @ 45th Street													
South Crosswalk	33	C	18	D	31	C							
West Crosswalk	23	D	18	D	20	D							
MADISON AVENUE @ 43rd Street													
North Crosswalk	18	D	48	B	22	D							
East Crosswalk	11.0	E	10.0	E	13.0	E	15	E	13	E	17	D	Widen east crosswalk from 14 ft to 19 ft.
South Crosswalk	19	D	37	C	22	D							
MADISON AVENUE @ 44th Street													
North Crosswalk	29	C	41	B	26	C							
East Crosswalk	16	D	10.0	E	14.0	E	18	D	11	E	15	D	Widen east crosswalk from 14 ft to 16 ft.
South Crosswalk	23	D	24	C	27	C							
MADISON AVENUE @ 45th Street													
North Crosswalk	15	E	28	C	17	D							
East Crosswalk	21	D	18	D	14.0	E	23	D	20	D	15	D	Widen east crosswalk from 15.5 ft to 17 ft.
South Crosswalk	32	C	33	C	18	D							
MADISON AVENUE @ 46th Street													
North Crosswalk	49	B	69	B	46	B							
East Crosswalk	15	E	12.0	E	9.0	E	19	D	16	D	12	E	Widen east crosswalk from 12.5 ft to 16 ft.
South Crosswalk	20	D	34	D	34	C							
MADISON AVENUE @ 47th Street													
North Crosswalk	20	D	43	B	20	D							
East Crosswalk	17	D	12.0	E	9.0	E	21	D	15	D	11	E	Widen east crosswalk from 12 ft to 15 ft.
South Crosswalk	29	C	31	C	31	C							
MADISON AVENUE @ 48th Street													
North Crosswalk	12.0	E	24	C	16	D	15	E	29	C	20	D	Widen north crosswalk from 14 ft to 17 ft.
East Crosswalk	12.0	E	10.0	E	8.0	E	18	D	14	E	11	E	Widen east crosswalk from 15 ft to 25 ft.
South Crosswalk	32	C	35	C	33	C							
VANDERBILT AVENUE @ 42nd Street													
North Crosswalk	9	E	11.0	E	7	E	9	E	12	E	7	E	Widen north crosswalk from 22 ft to 23 ft.
East Crosswalk	23	D	36	C	28	C							
VANDERBILT AVENUE @ 44th Street													
North Crosswalk	22	D	25	C	27	C							
West Crosswalk	34	C	31	C	34	C							
VANDERBILT AVENUE @ 45th Street													
North Crosswalk	23	D	12	E	18	D							
West Crosswalk	34	C	31	C	35	C							
South Crosswalk	24	D	11	D	14	E							
East Crosswalk	21	D	23	D	23	D							
VANDERBILT AVENUE @ 46th Street													
North Crosswalk	45	B	32	C	41	B							
East Crosswalk	27	C	18	D	25	C							
South Crosswalk	56	B	23	D	41	B							
West Crosswalk	30	C	32	C	26	C							
VANDERBILT AVENUE @ 47th Street													
South Crosswalk	31	C	32	C	30	C							
West Crosswalk	24	C	35	C	30	C							
PARK AVENUE @ 48th Street													
North Crosswalk	76	B	54	B	58	B							
East Crosswalk	17	D	31	C	20	D							
South Crosswalk	62	B	78	B	92	B							
West Crosswalk	17	D	22	D	22	D							
PARK AVENUE @ 42nd Street													
East Crosswalk	21	D	29	D	33	C							
West Crosswalk	25	C	33	C	22	D							

TABLE M-8

EXISTING
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	1,210	-	1,210	-	-	-	225	1.08	over capacity
	1 Down Escalator	-	80	80	-	-	-	75	0.21	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	80	425	505	20.0	18.0	20	216	0.47	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	120	5	125	9.0	8.0	20	64	0.39	A
	South Stairs from LL	20	25	45	9.0	8.0	10	72	0.13	A
	Up Escalator (3)	25	-	25	-	-	-	60	0.08	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	410	280	690	26.0	24.0	10	324	0.43	A
	South Corridor	480	445	925	21.0	19.0	10	257	0.72	C
4. HYATT PASSAGEWAY	Corridor	240	385	625	19.0	17.0	10	230	0.54	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	405	290	695	19.0	16.0	10	144	0.97	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	360	215	575	9.0	8.0	10	72	1.60	E
	Up Escalator	435	-	435	-	-	-	75	1.16	over capacity
	Down Escalator	-	295	295	-	-	-	75	0.79	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	510	610	1,120	30.0	28.0	10	378	0.59	B
8. LOWER CONCOURSE EAST RAMP	Ramp	20	200	220	17.0	15.0	20	180	0.24	A
9. 42nd ST. MAIN ENTRANCE	Corridor	80	250	330	21.0	19.0	20	228	0.29	A
10. SHUTTLE PASSAGEWAY	Corridor	275	260	535	19.0	17.0	10	230	0.47	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	75	260	335	14.0	12.0	20	144	0.47	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	180	15	195	9.0	8.0	20	64	0.61	B
	South Stairs from LL	10	10	20	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	215	-	215	-	-	-	75	0.57	under capacity
	Down Escalator (4)	-	20	20	-	-	-	75	0.05	under capacity
	North Corridor	485	195	680	26.0	24.0	20	288	0.47	B
	South Corridor	375	240	615	21.0	19.0	10	257	0.48	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	235	245	9.0	8.0	20	64	0.77	C
14. ROOSEVELT PASSAGEWAY	Corridor	10	520	530	11.0	9.0	20	108	0.98	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	3,355	-	3,355	-	-	-	225	0.99	under capacity
	1 Down Escalator	-	210	210	-	-	-	75	0.19	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	235	1,235	1,470	20.0	18.0	20	216	0.45	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	280	15	295	9.0	8.0	20	64	0.31	A
	South Stairs from LL	40	70	110	9.0	8.0	10	72	0.10	A
	Up Escalator (3)	60	-	60	-	-	-	60	0.07	under capacity
	Down Escalator (3)	-	25	25	-	-	-	60	0.03	under capacity
	North Corridor	870	825	1,695	26.0	24.0	10	324	0.35	A
	South Corridor	1,350	1,250	2,600	21.0	19.0	10	257	0.68	B
4. HYATT PASSAGEWAY	Corridor	695	1,015	1,710	19.0	17.0	10	230	0.50	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,050	725	1,775	19.0	16.0	10	144	0.82	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	770	600	1,370	9.0	8.0	10	72	1.27	D
	Up Escalator	890	-	890	-	-	-	75	0.79	under capacity
	Down Escalator	-	830	830	-	-	-	75	0.74	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,295	1,705	3,000	30.0	28.0	10	378	0.53	B
8. LOWER CONCOURSE EAST RAMP	Ramp	50	440	490	17.0	15.0	20	180	0.18	A
9. 42nd ST. MAIN ENTRANCE	Corridor	220	675	895	21.0	19.0	20	228	0.26	A
10. SHUTTLE PASSAGEWAY	Corridor	500	665	1,165	19.0	17.0	10	230	0.34	A
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	190	625	815	14.0	12.0	20	144	0.38	A
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	465	25	490	9.0	8.0	20	64	0.51	B
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.05	A
	Up Escalator (4)	420	-	420	-	-	-	75	0.37	under capacity
	Down Escalator (4)	-	35	35	-	-	-	75	0.03	under capacity
	North Corridor	1,075	460	1,535	26.0	24.0	20	288	0.36	A
	South Corridor	880	580	1,460	21.0	19.0	10	257	0.38	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	20	620	640	9.0	8.0	20	64	0.67	B
14. ROOSEVELT PASSAGEWAY	Corridor	15	1,335	1,350	11.0	9.0	20	108	0.83	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	180	-	180	-	-	-	75	0.48	under capacity
	3 Down Escalators	-	920	920	-	-	-	225	0.82	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	400	135	535	20.0	18.0	20	216	0.50	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	90	100	9.0	8.0	20	64	0.31	A
	South Stairs from LL	15	25	40	9.0	8.0	10	72	0.11	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	60	60	-	-	-	60	0.20	under capacity
	North Corridor	305	390	695	26.0	24.0	10	324	0.43	A
	South Corridor	400	490	890	21.0	19.0	10	257	0.69	B
4. HYATT PASSAGEWAY	Corridor	340	155	495	19.0	17.0	20	204	0.49	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	250	390	640	19.0	16.0	10	144	0.89	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	180	380	560	9.0	8.0	20	64	1.75	F
	Up Escalator	235	-	235	-	-	-	75	0.63	under capacity
	Down Escalator	-	295	295	-	-	-	75	0.79	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	465	585	1,050	30.0	28.0	10	378	0.56	B
8. LOWER CONCOURSE EAST RAMP	Ramp	155	25	180	17.0	15.0	20	180	0.20	A
9. 42nd ST. MAIN ENTRANCE	Corridor	275	110	385	21.0	19.0	20	228	0.34	A
10. SHUTTLE PASSAGEWAY	Corridor	205	310	515	19.0	17.0	10	230	0.45	A
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	285	70	355	14.0	12.0	20	144	0.49	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	10	195	205	9.0	8.0	20	64	0.64	B
	South Stairs from LL	5	10	15	9.0	8.0	20	64	0.05	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	160	160	-	-	-	75	0.43	under capacity
	North Corridor	340	460	800	26.0	24.0	10	324	0.49	B
	South Corridor	280	285	565	21.0	19.0	10	257	0.44	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	25	155	180	9.0	8.0	20	64	0.56	B
14. ROOSEVELT PASSAGEWAY	Corridor	390	10	400	11.0	9.0	20	108	0.74	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	480	-	480	-	-	-	75	0.43	under capacity
	3 Down Escalators	-	2,700	2,700	-	-	-	225	0.80	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	1,110	350	1,460	20.0	18.0	20	216	0.45	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	25	220	245	9.0	8.0	20	64	0.26	A
	South Stairs from LL	45	65	110	9.0	8.0	10	72	0.10	A
	Up Escalator (3)	15	-	15	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	150	150	-	-	-	60	0.17	under capacity
	North Corridor	895	930	1,825	26.0	24.0	10	324	0.38	A
	South Corridor	1,155	1,375	2,530	21.0	19.0	10	257	0.66	B
4. HYATT PASSAGEWAY	Corridor	950	435	1,385	19.0	17.0	20	204	0.45	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	580	1,020	1,600	19.0	16.0	10	144	0.74	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	445	930	1,375	9.0	8.0	20	64	1.43	E
	Up Escalator	635	-	635	-	-	-	75	0.56	under capacity
	Down Escalator	-	860	860	-	-	-	75	0.76	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,160	1,525	2,685	30.0	28.0	10	378	0.47	B
8. LOWER CONCOURSE EAST RAMP	Ramp	380	60	440	17.0	15.0	20	180	0.16	A
9. 42nd ST. MAIN ENTRANCE	Corridor	775	275	1,050	21.0	19.0	20	228	0.31	A
10. SHUTTLE PASSAGEWAY	Corridor	510	755	1,265	19.0	17.0	10	230	0.37	A
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	810	180	990	14.0	12.0	20	144	0.46	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	25	455	480	9.0	8.0	20	64	0.50	B
	South Stairs from LL	10	35	45	9.0	8.0	20	64	0.05	A
	Up Escalator (4)	15	-	15	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	370	370	-	-	-	75	0.33	under capacity
	North Corridor	485	1,215	1,700	26.0	24.0	20	288	0.39	A
	South Corridor	710	750	1,460	21.0	19.0	10	257	0.38	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	45	455	500	9.0	8.0	20	64	0.52	B
14. ROOSEVELT PASSAGEWAY	Corridor	1,120	25	1,145	11.0	9.0	20	108	0.71	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

TABLE M-9

2010 NO BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	900	-	900	-	-	-	225	0.80	under capacity
	1 Down Escalator	-	75	75	-	-	-	75	0.20	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	70	205	275	20.0	18.0	20	216	0.25	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	125	5	130	9.0	8.0	20	64	0.41	A
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	25	-	25	-	-	-	60	0.08	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	445	180	625	26.0	24.0	20	288	0.43	A
	South Corridor	505	435	940	21.0	19.0	10	257	0.73	C
3A. 43rd STREET PASSAGEWAY	Corridor	90	180	270	22.0	20.0	20	240	0.23	A
4. HYATT PASSAGEWAY	Corridor	190	335	525	19.0	17.0	10	230	0.46	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	425	325	750	19.0	16.0	10	144	1.04	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	390	185	575	9.0	8.0	20	64	1.80	F
	Up Escalator	435	-	435	-	-	-	75	1.16	over capacity
	Down Escalator	-	250	250	-	-	-	75	0.67	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	535	550	1,085	30.0	28.0	10	378	0.57	B
8. LOWER CONCOURSE EAST RAMP	Ramp	25	90	115	17.0	15.0	20	180	0.13	A
9. 42nd ST. MAIN ENTRANCE	Corridor	75	270	345	21.0	19.0	20	228	0.30	A
10. SHUTTLE PASSAGEWAY	Corridor	285	425	710	19.0	17.0	10	230	0.62	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	80	290	370	14.0	12.0	20	144	0.51	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	190	20	210	9.0	8.0	20	64	0.66	B
	South Stairs from LL	10	10	20	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	110	-	110	-	-	-	75	0.29	under capacity
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity
	North Corridor	485	60	545	26.0	24.0	20	288	0.38	A
	South Corridor	335	280	615	21.0	19.0	10	257	0.48	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	175	185	9.0	8.0	20	64	0.58	B
14. ROOSEVELT PASSAGEWAY	Corridor	10	120	130	11.0	9.0	20	108	0.24	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	2,500	-	2,500	-	-	-	225	0.74	under capacity
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	190	590	780	20.0	18.0	20	216	0.24	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	280	15	295	9.0	8.0	20	64	0.31	A
	South Stairs from LL	40	80	120	9.0	8.0	20	64	0.13	A
	Up Escalator (3)	55	-	55	-	-	-	60	0.06	under capacity
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity
	North Corridor	950	540	1,490	26.0	24.0	10	324	0.31	A
	South Corridor	1,420	1,235	2,655	21.0	19.0	10	257	0.69	B
3A. 43rd STREET PASSAGEWAY	Corridor	245	485	730	22.0	20.0	10	270	0.18	A
4. HYATT PASSAGEWAY	Corridor	550	635	1,185	19.0	17.0	10	230	0.34	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,105	810	1,915	19.0	16.0	10	144	0.89	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	925	550	1,475	9.0	8.0	10	72	1.37	E
	Up Escalator	935	-	935	-	-	-	75	0.83	under capacity
	Down Escalator	-	760	760	-	-	-	75	0.68	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,365	1,535	2,900	30.0	28.0	10	378	0.51	B
8. LOWER CONCOURSE EAST RAMP	Ramp	55	200	255	17.0	15.0	20	180	0.09	A
9. 42nd ST. MAIN ENTRANCE	Corridor	205	735	940	21.0	19.0	20	228	0.27	A
10. SHUTTLE PASSAGEWAY	Corridor	505	1,040	1,545	19.0	17.0	20	204	0.50	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	210	700	910	14.0	12.0	20	144	0.42	A
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	500	25	525	9.0	8.0	20	64	0.55	B
	South Stairs from LL	25	35	60	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	155	-	155	-	-	-	75	0.14	under capacity
	Down Escalator (4)	-	40	40	-	-	-	75	0.04	under capacity
	North Corridor	1,050	145	1,195	26.0	24.0	20	288	0.28	A
	South Corridor	760	685	1,445	21.0	19.0	10	257	0.38	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	20	460	480	9.0	8.0	20	64	0.50	B
14. ROOSEVELT PASSAGEWAY	Corridor	15	280	295	11.0	9.0	20	108	0.18	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	180	-	180	-	-	-	75	0.48	under capacity
	3 Down Escalators	-	545	545	-	-	-	225	0.48	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	185	110	295	20.0	18.0	10	243	0.24	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	95	105	9.0	8.0	20	64	0.33	A
	South Stairs from LL	20	25	45	9.0	8.0	10	72	0.13	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	70	70	-	-	-	60	0.23	under capacity
	North Corridor	220	425	645	26.0	24.0	10	324	0.40	A
	South Corridor	390	515	905	21.0	19.0	10	257	0.71	C
3A. 43rd STREET PASSAGEWAY	Corridor	145	65	210	22.0	20.0	20	240	0.18	A
4. HYATT PASSAGEWAY	Corridor	220	125	345	19.0	17.0	10	230	0.30	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	280	410	690	19.0	16.0	10	144	0.96	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	160	400	560	9.0	8.0	20	64	1.75	F
	Up Escalator	210	-	210	-	-	-	75	0.56	under capacity
	Down Escalator	-	310	310	-	-	-	75	0.83	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	425	615	1,040	30.0	28.0	10	378	0.55	B
8. LOWER CONCOURSE EAST RAMP	Ramp	80	30	110	17.0	15.0	20	180	0.12	A
9. 42nd ST. MAIN ENTRANCE	Corridor	300	110	410	21.0	19.0	20	228	0.36	A
10. SHUTTLE PASSAGEWAY	Corridor	325	320	645	19.0	17.0	10	230	0.56	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	320	75	395	14.0	12.0	20	144	0.55	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	190	205	9.0	8.0	20	64	0.64	B
	South Stairs from LL	5	15	20	9.0	8.0	20	64	0.06	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	120	120	-	-	-	75	0.32	under capacity
	North Corridor	105	470	575	26.0	24.0	20	288	0.40	A
	South Corridor	315	240	555	21.0	19.0	10	257	0.43	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	120	25	145	9.0	8.0	20	64	0.45	B
14. ROOSEVELT PASSAGEWAY	Corridor	90	10	100	11.0	9.0	20	108	0.19	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	480	-	480	-	-	-	75	0.43	under capacity
	3 Down Escalators	-	1,600	1,600	-	-	-	225	0.47	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	560	285	845	20.0	18.0	10	243	0.23	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	75	55	130	9.0	8.0	10	72	0.12	A
	South Stairs from LL	10	245	255	9.0	8.0	20	64	0.27	A
	Up Escalator (3)	20	-	20	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	180	180	-	-	-	60	0.20	under capacity
	North Corridor	710	1,015	1,725	26.0	24.0	10	324	0.35	A
	South Corridor	1,150	1,445	2,595	21.0	19.0	10	257	0.67	B
3A. 43rd STREET PASSAGEWAY	Corridor	395	175	570	22.0	20.0	20	240	0.16	A
4. HYATT PASSAGEWAY	Corridor	600	345	945	19.0	17.0	10	230	0.27	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	700	1,070	1,770	19.0	16.0	10	144	0.82	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	400	1,000	1,400	9.0	8.0	20	64	1.46	E
	Up Escalator	570	-	570	-	-	-	75	0.51	under capacity
	Down Escalator	-	900	900	-	-	-	75	0.80	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,055	1,610	2,665	30.0	28.0	10	378	0.47	B
8. LOWER CONCOURSE EAST RAMP	Ramp	200	70	270	17.0	15.0	20	180	0.10	A
9. 42nd ST. MAIN ENTRANCE	Corridor	845	265	1,110	21.0	19.0	20	228	0.32	A
10. SHUTTLE PASSAGEWAY	Corridor	880	780	1,660	19.0	17.0	10	230	0.48	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	980	195	1,175	14.0	12.0	20	144	0.54	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	35	505	540	9.0	8.0	20	64	0.56	B
	South Stairs from LL	5	35	40	9.0	8.0	20	64	0.04	A
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity
	Down Escalator (4)	-	135	135	-	-	-	75	0.12	under capacity
	North Corridor	265	1,320	1,585	26.0	24.0	20	288	0.37	A
	South Corridor	760	825	1,585	21.0	19.0	10	257	0.41	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	365	50	415	9.0	8.0	20	64	0.43	A
14. ROOSEVELT PASSAGEWAY	Corridor	275	30	305	11.0	9.0	20	108	0.19	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

TABLE M-10

2020 NO BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	975	-	975	-	-	-	225	0.87	under capacity
	1 Down Escalator	-	80	80	-	-	-	75	0.21	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	70	230	300	20.0	18.0	20	216	0.28	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	140	5	145	9.0	8.0	20	64	0.45	B
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	25	-	25	-	-	-	60	0.08	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	485	200	685	26.0	24.0	20	288	0.48	B
	South Corridor	525	485	1,010	21.0	19.0	10	257	0.79	C
3A. 43rd STREET PASSAGEWAY	Corridor	95	200	295	22.0	20.0	20	240	0.25	A
4. HYATT PASSAGEWAY	Corridor	200	280	480	19.0	17.0	10	230	0.42	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	445	360	805	19.0	16.0	10	144	1.12	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	420	205	625	9.0	8.0	20	64	1.95	F
	Up Escalator	435	-	435	-	-	-	75	1.16	over capacity
	Down Escalator	-	280	280	-	-	-	75	0.75	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	565	605	1,170	30.0	28.0	10	378	0.62	B
8. LOWER CONCOURSE EAST RAMP	Ramp	25	100	125	17.0	15.0	20	180	0.14	A
9. 42nd ST. MAIN ENTRANCE	Corridor	80	295	375	21.0	19.0	20	228	0.33	A
10. SHUTTLE PASSAGEWAY	Corridor	295	470	765	19.0	17.0	10	230	0.67	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	90	325	415	14.0	12.0	20	144	0.58	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	215	20	235	9.0	8.0	20	64	0.73	C
	South Stairs from LL	10	10	20	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	125	-	125	-	-	-	75	0.33	under capacity
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity
	North Corridor	540	70	610	26.0	24.0	20	288	0.42	A
	South Corridor	365	305	670	21.0	19.0	10	257	0.52	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	195	205	9.0	8.0	20	64	0.64	B
14. ROOSEVELT PASSAGEWAY	Corridor	10	130	140	11.0	9.0	20	108	0.26	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M -10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	2,705	-	2,705	-	-	-	225	1.00	under capacity
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	210	655	865	20.0	18.0	20	216	0.27	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	310	20	330	9.0	8.0	20	64	0.34	A
	South Stairs from LL	45	85	130	9.0	8.0	10	72	0.12	A
	Up Escalator (3)	60	-	60	-	-	-	60	0.07	under capacity
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity
	North Corridor	1,025	600	1,625	26.0	24.0	10	324	0.33	A
	South Corridor	1,485	1,370	2,855	21.0	19.0	10	257	0.74	C
3A. 43rd STREET PASSAGEWAY	Corridor	285	540	825	22.0	20.0	10	270	0.20	A
4. HYATT PASSAGEWAY	Corridor	575	705	1,280	19.0	17.0	10	230	0.37	A
5. EASTERN 1RT SUBWAY STAIRS	Stairs	1,155	900	2,055	19.0	16.0	10	144	0.95	C
6. WESTERN 1RT SUBWAY STAIRS / ESCALATORS	Stairs	965	640	1,605	9.0	8.0	10	72	1.49	E
	Up Escalator	975	-	975	-	-	-	75	0.87	under capacity
	Down Escalator	-	815	815	-	-	-	75	0.72	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,430	1,780	3,210	30.0	28.0	10	378	0.57	B
8. LOWER CONCOURSE EAST RAMP	Ramp	60	225	285	17.0	15.0	20	180	0.11	A
9. 42nd ST. MAIN ENTRANCE	Corridor	205	800	1,005	21.0	19.0	20	228	0.29	A
10. SHUTTLE PASSAGEWAY	Corridor	530	1,150	1,680	19.0	17.0	20	204	0.55	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	225	775	1,000	14.0	12.0	20	144	0.46	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	555	30	585	9.0	8.0	20	64	0.61	B
	South Stairs from LL	30	40	70	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	175	-	175	-	-	-	75	0.16	under capacity
	Down Escalator (4)	-	45	45	-	-	-	75	0.04	under capacity
	North Corridor	1,165	160	1,325	26.0	24.0	20	288	0.31	A
	South Corridor	825	750	1,575	21.0	19.0	10	257	0.41	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	25	510	535	9.0	8.0	20	64	0.56	B
14. ROOSEVELT PASSAGEWAY	Corridor	20	310	330	11.0	9.0	20	108	0.20	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	185	-	185	-	-	-	75	0.49	under capacity
	3 Down Escalators	-	590	590	-	-	-	225	0.52	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	210	120	330	20.0	18.0	10	243	0.27	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	100	110	9.0	8.0	20	64	0.34	A
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	75	75	-	-	-	60	0.25	under capacity
	North Corridor	245	460	705	26.0	24.0	10	324	0.44	A
	South Corridor	435	540	975	21.0	19.0	10	257	0.76	C
3A. 43rd STREET PASSAGEWAY	Corridor	155	65	220	22.0	20.0	20	240	0.18	A
4. HYATT PASSAGEWAY	Corridor	245	130	375	19.0	17.0	10	230	0.33	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	310	430	740	19.0	16.0	10	144	1.03	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	175	415	590	9.0	8.0	20	64	1.84	F
	Up Escalator	235	-	235	-	-	-	75	0.63	under capacity
	Down Escalator	-	325	325	-	-	-	75	0.87	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	470	645	1,115	30.0	28.0	10	378	0.59	B
8. LOWER CONCOURSE EAST RAMP	Ramp	85	30	115	17.0	15.0	20	180	0.13	A
9. 42nd ST. MAIN ENTRANCE	Corridor	325	110	435	21.0	19.0	20	228	0.38	A
10. SHUTTLE PASSAGEWAY	Corridor	360	335	695	19.0	17.0	10	230	0.61	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	355	85	440	14.0	12.0	20	144	0.61	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	215	230	9.0	8.0	20	64	0.72	C
	South Stairs from LL	5	15	20	9.0	8.0	20	64	0.06	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	130	130	-	-	-	75	0.35	under capacity
	North Corridor	120	520	640	26.0	24.0	20	288	0.44	A
	South Corridor	340	265	605	21.0	19.0	10	257	0.47	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	130	30	160	9.0	8.0	20	64	0.50	B
14. ROOSEVELT PASSAGEWAY	Corridor	100	10	110	11.0	9.0	20	108	0.20	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	490	-	490	-	-	-	75	0.44	under capacity
	3 Down Escalators	-	1,730	1,730	-	-	-	225	0.51	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	770	415	1,185	20.0	18.0	10	243	0.33	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	55	70	125	9.0	8.0	10	72	0.12	A
	South Stairs from LL	30	240	270	9.0	8.0	20	64	0.28	A
	Up Escalator (3)	20	-	20	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	185	185	-	-	-	60	0.21	under capacity
	North Corridor	730	1,095	1,825	26.0	24.0	10	324	0.38	A
	South Corridor	1,275	1,510	2,785	21.0	19.0	10	257	0.72	C
3A. 43rd STREET PASSAGEWAY	Corridor	450	185	635	22.0	20.0	20	240	0.18	A
4. HYATT PASSAGEWAY	Corridor	670	360	1,030	19.0	17.0	10	230	0.30	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	720	1,120	1,840	19.0	16.0	10	144	0.85	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	440	1,025	1,465	9.0	8.0	20	64	1.53	E
	Up Escalator	635	-	635	-	-	-	75	0.56	under capacity
	Down Escalator	-	945	945	-	-	-	75	0.84	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,165	1,685	2,850	30.0	28.0	10	378	0.50	B
8. LOWER CONCOURSE EAST RAMP	Ramp	205	75	280	17.0	15.0	20	180	0.10	A
9. 42nd ST. MAIN ENTRANCE	Corridor	915	270	1,185	21.0	19.0	20	228	0.35	A
10. SHUTTLE PASSAGEWAY	Corridor	900	815	1,715	19.0	17.0	10	230	0.50	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	1010	215	1,225	14.0	12.0	20	144	0.57	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	30	515	545	9.0	8.0	20	64	0.57	B
	South Stairs from LL	15	40	55	9.0	8.0	20	64	0.06	A
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity
	Down Escalator (4)	-	135	135	-	-	-	75	0.12	under capacity
	North Corridor	275	1,355	1,630	26.0	24.0	20	288	0.38	A
	South Corridor	825	900	1,725	21.0	19.0	10	257	0.45	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	375	55	430	9.0	8.0	20	64	0.45	A
14. ROOSEVELT PASSAGEWAY	Corridor	280	30	310	11.0	9.0	20	108	0.19	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

TABLE M-11

2010 BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	1,005	-	1,005	-	-	-	225	0.89	under capacity	
	1 Down Escalator	-	75	75	-	-	-	75	0.20	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	70	280	350	20.0	18.0	20	216	0.32	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	150	5	155	9.0	8.0	20	64	0.48	B	
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A	
	Up Escalator (3)	35	-	35	-	-	-	60	0.12	under capacity	
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity	
	North Corridor	445	260	705	26.0	24.0	10	324	0.44	A	
	South Corridor	505	535	1,040	21.0	19.0	10	257	0.81	C	
3A. 43rd STREET PASSAGEWAY	Corridor	90	230	320	22.0	20.0	20	240	0.27	A	
4. HYATT PASSAGEWAY	Corridor	190	355	545	19.0	17.0	10	230	0.47	B	
5. EASTERN IRT SUBWAY STAIRS	Stairs	425	350	775	19.0	16.0	10	144	1.08	D	*
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	390	260	650	9.0	8.0	10	72	**1.81**	F	
	Up Escalator	435	-	435	-	-	-	75	**1.16**	**over capacity**	
	Down Escalator	-	360	360	-	-	-	75	0.96	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	535	755	1,290	30.0	28.0	10	378	0.68	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	25	335	360	17.0	15.0	20	180	0.40	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	75	390	465	21.0	19.0	20	228	0.41	A	
10. SHUTTLE PASSAGEWAY	Corridor	285	510	795	19.0	17.0	10	230	0.69	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	80	475	555	14.0	12.0	20	144	0.77	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	375	20	395	9.0	8.0	20	64	1.23	D	*
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A	
	Up Escalator (4)	840	-	840	-	-	-	75	**2.24**	**over capacity**	*
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity	
	North Corridor	725	85	810	26.0	24.0	20	288	0.56	B	
	South Corridor	370	305	675	21.0	19.0	10	257	0.53	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	305	315	9.0	8.0	20	64	0.98	C	
14. ROOSEVELT PASSAGEWAY	Corridor	10	255	265	11.0	9.0	20	108	0.49	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M-11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	2,810	-	2,810	-	-	-	225	0.83	under capacity	
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	190	810	1,000	20.0	18.0	20	216	0.31	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	345	15	360	9.0	8.0	20	64	0.38	A	
	South Stairs from LL	45	80	125	9.0	8.0	10	72	0.12	A	
	Up Escalator (3)	90	-	90	-	-	-	60	0.10	under capacity	
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity	
	North Corridor	950	785	1,735	26.0	24.0	10	324	0.36	A	
	South Corridor	1,420	1,540	2,960	21.0	19.0	10	257	0.77	C	
3A. 43rd STREET PASSAGEWAY	Corridor	245	630	875	22.0	20.0	20	240	0.24	A	
4. HYATT PASSAGEWAY	Corridor	550	940	1,490	19.0	17.0	10	230	0.43	A	
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,105	880	1,985	19.0	16.0	10	144	0.92	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	875	775	1,650	9.0	8.0	10	72	1.53	E	*
	Up Escalator	985	-	985	-	-	-	75	0.88	under capacity	
	Down Escalator	-	1,075	1,075	-	-	-	75	0.96	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,365	2,145	3,510	30.0	28.0	10	378	0.62	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	55	935	990	17.0	15.0	20	180	0.37	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	205	1,095	1,300	21.0	19.0	20	228	0.38	A	
10. SHUTTLE PASSAGEWAY	Corridor	505	1,290	1,795	19.0	17.0	20	204	0.59	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	210	1,245	1,455	14.0	12.0	20	144	0.67	B	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	1,045	25	1,070	9.0	8.0	20	64	1.11	D	*
	South Stairs from LL	55	35	90	9.0	8.0	10	72	0.08	A	
	Up Escalator (4)	2,310	-	2,310	-	-	-	75	**2.05**	**over capacity**	*
	Down Escalator (4)	-	40	40	-	-	-	75	0.04	under capacity	
	North Corridor	1,770	215	1,985	26.0	24.0	20	288	0.46	B	
	South Corridor	870	755	1,625	21.0	19.0	10	257	0.42	A	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	20	840	860	9.0	8.0	20	64	0.90	C	
14. ROOSEVELT PASSAGEWAY	Corridor	15	675	690	11.0	9.0	20	108	0.43	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

* * * Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	180	-	180	-	-	-	75	0.48	under capacity
	3 Down Escalators	-	635	635	-	-	-	225	0.56	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	245	110	355	20.0	18.0	20	216	0.33	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	110	120	9.0	8.0	20	64	0.38	A
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	80	80	-	-	-	60	0.27	under capacity
	North Corridor	290	425	715	26.0	24.0	10	324	0.44	A
	South Corridor	475	515	990	21.0	19.0	10	257	0.77	C
3A. 43rd STREET PASSAGEWAY	Corridor	185	65	250	22.0	20.0	20	240	0.21	A
4. HYATT PASSAGEWAY	Corridor	310	125	435	19.0	17.0	20	204	0.43	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	300	410	710	19.0	16.0	10	144	0.99	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	225	400	625	9.0	8.0	10	72	1.74	F
	Up Escalator	300	-	300	-	-	-	75	0.80	under capacity
	Down Escalator	-	310	310	-	-	-	75	0.83	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	600	615	1,215	30.0	28.0	10	378	0.64	B
8. LOWER CONCOURSE EAST RAMP	Ramp	290	30	320	17.0	15.0	20	180	0.36	A
9. 42nd ST. MAIN ENTRANCE	Corridor	405	110	515	21.0	19.0	20	228	0.45	B
10. SHUTTLE PASSAGEWAY	Corridor	400	320	720	19.0	17.0	10	230	0.63	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	475	75	550	14.0	12.0	20	144	0.76	C
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	345	360	9.0	8.0	20	64	1.13	D *
	South Stairs from LL	5	25	30	9.0	8.0	20	64	0.09	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	740	740	-	-	-	75	1.97	over capacity
	North Corridor	125	675	800	26.0	24.0	20	288	0.56	B
	South Corridor	335	270	605	21.0	19.0	10	257	0.47	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	230	25	255	9.0	8.0	20	64	0.80	C
14. ROOSEVELT PASSAGEWAY	Corridor	205	10	215	11.0	9.0	20	108	0.40	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	480	-	480	-	-	-	75	0.43	under capacity	
	3 Down Escalators	-	1,865	1,865	-	-	-	225	0.55	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	750	285	1,035	20.0	18.0	20	216	0.32	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	75	65	140	9.0	8.0	10	72	0.13	A	
	South Stairs from LL	10	295	305	9.0	8.0	20	64	0.32	A	
	Up Escalator (3)	20	-	20	-	-	-	60	0.02	under capacity	
	Down Escalator (3)	-	210	210	-	-	-	60	0.23	under capacity	
	North Corridor	920	1,015	1,935	26.0	24.0	10	324	0.40	A	
	South Corridor	1,410	1,445	2,855	21.0	19.0	10	257	0.74	C	
3A. 43rd STREET PASSAGEWAY	Corridor	515	175	690	22.0	20.0	20	240	0.19	A	
4. HYATT PASSAGEWAY	Corridor	860	345	1,205	19.0	17.0	20	204	0.39	A	
5. EASTERN IRT SUBWAY STAIRS	Stairs	760	1,070	1,830	19.0	16.0	10	144	0.85	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	585	990	1,575	9.0	8.0	10	72	1.46	E	
	Up Escalator	845	-	845	-	-	-	75	0.75	under capacity	
	Down Escalator	-	910	910	-	-	-	75	0.81	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,575	1,610	3,185	30.0	28.0	10	378	0.56	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	825	70	895	17.0	15.0	20	180	0.33	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	1,150	265	1,415	21.0	19.0	20	228	0.41	A	
10. SHUTTLE PASSAGEWAY	Corridor	1,095	780	1,875	19.0	17.0	10	230	0.54	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	1,440	195	1,635	14.0	12.0	20	144	0.76	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	35	970	1,005	9.0	8.0	20	64	1.05	D	*
	South Stairs from LL	5	60	65	9.0	8.0	20	64	0.07	A	
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity	
	Down Escalator (4)	-	1,975	1,975	-	-	-	75	1.76	over capacity	*
	North Corridor	325	1,930	2,255	26.0	24.0	20	288	0.52	B	
	South Corridor	820	915	1,735	21.0	19.0	10	257	0.45	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	690	50	740	9.0	8.0	20	64	0.77	C	
14. ROOSEVELT PASSAGEWAY	Corridor	610	30	640	11.0	9.0	20	108	0.40	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C, < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-12

2020 BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	3,030	-	3,030	-	-	-	225	0.90	under capacity
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	210	890	1,100	20.0	18.0	20	216	0.34	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	380	20	400	9.0	8.0	20	64	0.42	A
	South Stairs from LL	55	85	140	9.0	8.0	10	72	0.13	A
	Up Escalator (3)	100	-	100	-	-	-	60	0.11	under capacity
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity
	North Corridor	1,025	855	1,880	26.0	24.0	10	324	0.39	A
	South Corridor	1,485	1,690	3,175	21.0	19.0	10	257	0.83	C
3A. 43rd STREET PASSAGEWAY	Corridor	285	690	975	22.0	20.0	20	240	0.27	A
4. HYATT PASSAGEWAY	Corridor	575	1,025	1,600	19.0	17.0	10	230	0.46	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,155	975	2,130	19.0	16.0	10	144	0.99	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	905	850	1,755	9.0	8.0	10	72	1.63	E *
	Up Escalator	1,035	-	1,035	-	-	-	75	0.92	under capacity
	Down Escalator	-	1,170	1,170	-	-	-	75	1.04	over capacity *
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,430	2,420	3,850	30.0	28.0	10	378	0.68	B
8. LOWER CONCOURSE EAST RAMP	Ramp	60	995	1,055	17.0	15.0	20	180	0.39	A
9. 42nd ST. MAIN ENTRANCE	Corridor	205	1,180	1,385	21.0	19.0	20	228	0.40	A
10. SHUTTLE PASSAGEWAY	Corridor	530	1,415	1,945	19.0	17.0	20	204	0.64	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	225	1,350	1,575	14.0	12.0	20	144	0.73	C
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	1,160	30	1,190	9.0	8.0	20	64	1.24	D *
	South Stairs from LL	60	40	100	9.0	8.0	10	72	0.09	A
	Up Escalator (4)	2,555	-	2,555	-	-	-	75	2.27	over capacity *
	Down Escalator (4)	-	45	45	-	-	-	75	0.04	under capacity
	North Corridor	1,950	240	2,190	26.0	24.0	20	288	0.51	B
	South Corridor	945	830	1,775	21.0	19.0	10	257	0.46	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	25	910	935	9.0	8.0	20	64	0.97	C
14. ROOSEVELT PASSAGEWAY	Corridor	20	725	745	11.0	9.0	20	108	0.46	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
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(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

* * * Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	1,085	-	1,085	-	-	-	225	0.96	under capacity	
	1 Down Escalator	-	80	80	-	-	-	75	0.21	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	70	310	380	20.0	18.0	20	216	0.35	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	160	5	165	9.0	8.0	20	64	0.52	B	
	South Stairs from LL	25	30	55	9.0	8.0	10	72	0.15	A	
	Up Escalator (3)	40	-	40	-	-	-	60	0.13	under capacity	
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity	
	North Corridor	485	285	770	26.0	24.0	10	324	0.48	B	
	South Corridor	525	595	1,120	21.0	19.0	10	257	0.87	C	
3A. 43rd STREET PASSAGEWAY	Corridor	95	250	345	22.0	20.0	20	240	0.29	A	
4. HYATT PASSAGEWAY	Corridor	200	390	590	19.0	17.0	10	230	0.51	B	
5. EASTERN IRT SUBWAY STAIRS	Stairs	445	385	830	19.0	16.0	10	144	1.15	D	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	420	285	705	9.0	8.0	10	72	1.96	F	*
	Up Escalator	435	-	435	-	-	-	75	1.16	over capacity	
	Down Escalator	-	390	390	-	-	-	75	1.04	over capacity	*
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	565	820	1,385	30.0	28.0	10	378	0.73	C	
8. LOWER CONCOURSE EAST RAMP	Ramp	25	360	385	17.0	15.0	20	180	0.43	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	80	425	505	21.0	19.0	20	228	0.44	A	
10. SHUTTLE PASSAGEWAY	Corridor	295	560	855	19.0	17.0	10	230	0.75	C	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	90	520	610	14.0	12.0	20	144	0.85	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	410	20	430	9.0	8.0	20	64	1.34	E	*
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A	
	Up Escalator (4)	895	-	895	-	-	-	75	2.39	over capacity	*
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity	
	North Corridor	785	95	880	26.0	24.0	20	288	0.61	B	
	South Corridor	400	330	730	21.0	19.0	10	257	0.57	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	330	340	9.0	8.0	20	64	1.06	D	*
14. ROOSEVELT PASSAGEWAY	Corridor	10	270	280	11.0	9.0	20	108	0.52	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
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(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

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Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	185	-	185	-	-	-	75	0.49	under capacity	
	3 Down Escalators	-	685	685	-	-	-	225	0.61	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	275	120	395	20.0	18.0	20	216	0.37	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	115	125	9.0	8.0	20	64	0.39	A	
	South Stairs from LL	20	35	55	9.0	8.0	10	72	0.15	A	
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity	
	Down Escalator (3)	-	85	85	-	-	-	60	0.28	under capacity	
	North Corridor	355	460	815	26.0	24.0	10	324	0.50	B	
	South Corridor	570	540	1,110	21.0	19.0	10	257	0.87	C	
3A. 43rd STREET PASSAGEWAY	Corridor	200	65	265	22.0	20.0	20	240	0.22	A	
4. HYATT PASSAGEWAY	Corridor	335	130	465	19.0	17.0	20	204	0.46	B	
5. EASTERN IRT SUBWAY STAIRS	Stairs	330	430	760	19.0	16.0	10	144	1.06	D	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	245	415	660	9.0	8.0	10	72	1.83	F	
	Up Escalator	325	-	325	-	-	-	75	0.87	under capacity	
	Down Escalator	-	325	325	-	-	-	75	0.87	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	650	645	1,295	30.0	28.0	10	378	0.69	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	410	30	440	17.0	15.0	20	180	0.49	B	
9. 42nd ST. MAIN ENTRANCE	Corridor	435	110	545	21.0	19.0	20	228	0.48	B	
10. SHUTTLE PASSAGEWAY	Corridor	435	335	770	19.0	17.0	10	230	0.67	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	520	85	605	14.0	12.0	20	144	0.84	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	375	390	9.0	8.0	20	64	1.22	D	*
	South Stairs from LL	5	30	35	9.0	8.0	20	64	0.11	A	
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity	
	Down Escalator (4)	-	780	780	-	-	-	75	2.08	over capacity	*
	North Corridor	140	735	875	26.0	24.0	20	288	0.61	B	
	South Corridor	360	295	655	21.0	19.0	10	257	0.51	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	245	30	275	9.0	8.0	20	64	0.86	C	
14. ROOSEVELT PASSAGEWAY	Corridor	220	10	230	11.0	9.0	20	108	0.43	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
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(4) Elements facing NYCT Museum Store

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Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	490	-	490	-	-	-	75	0.44	under capacity
	3 Down Escalators	-	2,010	2,010	-	-	-	225	0.60	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	970	415	1,385	20.0	18.0	20	216	0.43	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	55	85	140	9.0	8.0	10	72	0.13	A
	South Stairs from LL	30	290	320	9.0	8.0	20	64	0.33	A
	Up Escalator (3)	50	-	50	-	-	-	60	0.06	under capacity
	Down Escalator (3)	-	215	215	-	-	-	60	0.24	under capacity
	North Corridor	950	1,095	2,045	26.0	24.0	10	324	0.42	A
	South Corridor	1,545	1,510	3,055	21.0	19.0	10	257	0.79	C
3A. 43rd STREET PASSAGEWAY	Corridor	580	185	765	22.0	20.0	20	240	0.21	A
4. HYATT PASSAGEWAY	Corridor	945	360	1,305	19.0	17.0	20	204	0.43	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	785	1,120	1,905	19.0	16.0	10	144	0.88	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	635	1,025	1,660	9.0	8.0	10	72	1.54	E *
	Up Escalator	920	-	920	-	-	-	75	0.82	under capacity
	Down Escalator	-	945	945	-	-	-	75	0.84	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,710	1,685	3,395	30.0	28.0	10	378	0.60	B
8. LOWER CONCOURSE EAST RAMP	Ramp	860	75	935	17.0	15.0	20	180	0.35	A
9. 42nd ST. MAIN ENTRANCE	Corridor	1,235	270	1,505	21.0	19.0	20	228	0.44	A
10. SHUTTLE PASSAGEWAY	Corridor	1,125	815	1,940	19.0	17.0	10	230	0.56	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	1,495	215	1,710	14.0	12.0	20	144	0.79	C
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	30	995	1,025	9.0	8.0	20	64	1.07	D *
	South Stairs from LL	15	75	90	9.0	8.0	20	64	0.09	A
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity
	Down Escalator (4)	-	2,070	2,070	-	-	-	75	1.84	over capacity *
	North Corridor	340	2,000	2,340	26.0	24.0	20	288	0.54	B
	South Corridor	890	995	1,885	21.0	19.0	10	257	0.49	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	715	55	770	9.0	8.0	20	64	0.80	C
14. ROOSEVELT PASSAGEWAY	Corridor	635	30	665	11.0	9.0	20	108	0.41	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-13

2010 MITIGATED BUILD GCT INTERNAL PEDESTRIAN ANALYSES

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,105	820	1,925	19.0	16.0	10	144	0.89	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	925	635	1,560	9.0	8.0	10	72	1.44	E *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	1,045	65	1,110	9.0	8.0	20	64	1.16	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	55	35	90	9.0	8.0	10	72	0.08	A	
	Up Escalators (4)	2,310	-	2,310	-	-	-	150	1.03	over capacity *	Direct both escalators up in AM (reassign down flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

* * * Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	285	410	695	19.0	16.0	10	144	0.97	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	185	400	585	9.0	8.0	20	64	**1.83**	F *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	20	345	365	9.0	8.0	20	64	1.14	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	5	25	30	9.0	8.0	20	64	0.09	A	
	Down Escalators (4)	-	740	740	-	-	-	150	0.99	under capacity	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	425	330	755	19.0	16.0	10	144	1.05	D	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	390	215	605	9.0	8.0	10	72	**1.68**	**F** *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	375	45	420	9.0	8.0	20	64	1.31	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A	
	Up Escalators (4)	840	-	840	-	-	-	150	**1.12**	**over capacity** *	Direct both escalators up in AM (reassign down flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

* * * Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)			MAXIMUM PROCESSING RATE (1)	V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	710	1,070	1,780	19.0	16.0	10	144	0.82	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	470	1,000	1,470	9.0	8.0	20	64	1.53	E *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	55	970	1,025	9.0	8.0	20	64	1.07	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	5	60	65	9.0	8.0	20	64	0.07	A	
	Down Escalators (4)	-	1,975	1,975	-	-	-	150	0.88	under capacity	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
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TABLE M-14

2020 MITIGATED BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	445	365	810	19.0	16.0	10	144	1.13	D	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	420	235	655	9.0	8.0	10	72	**1.82**	**F** *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	410	45	455	9.0	8.0	20	64	1.42	E *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A	
	Up Escalators (4)	895	-	895	-	-	-	150	**1.19**	**over capacity** *	Direct both escalators up in AM (reassign down flow to nearest stair).
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	330	340	9.0	8.0	20	64	1.06	D *	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
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Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,155	910	2,065	19.0	16.0	10	144	0.96	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	965	735	1,700	9.0	8.0	10	72	1.57	E *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	1,160	75	1,235	9.0	8.0	20	64	1.29	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	60	40	100	9.0	8.0	10	72	0.09	A	
	Up Escalators (4)	2,555	-	2,555	-	-	-	150	1.14	over capacity *	Direct both escalators up in AM (reassign down flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
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(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

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Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	315	430	745	19.0	16.0	10	144	1.03	D	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWA STAIRS / ESCALATORS	Stairs	200	415	615	9.0	8.0	20	64	**1.92**	**F** *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	20	375	395	9.0	8.0	20	64	1.23	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	5	30	35	9.0	8.0	20	64	0.11	A	
	Down Escalators (4)	-	780	780	-	-	-	150	**1.04**	**over capacity** *	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
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(4) Elements facing NYCT Museum Store

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Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	730	1,120	1,850	19.0	16.0	10	144	0.86	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWA STAIRS / ESCALATORS	Stairs	515	1,025	1,540	9.0	8.0	10	72	1.43	E	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	50	995	1,045	9.0	8.0	20	64	1.09	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	15	75	90	9.0	8.0	20	64	0.09	A	
	Down Escalators (4)	-	2,070	2,070	-	-	-	150	0.92	under capacity	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
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(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

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TABLE M-15

SUBWAY MEZZANINE "B" PEDESTRIAN ANALYSES

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (pax)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E*F*G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (pax-min) I*L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) H+O	Time-Space Required as % of Time-Space Available (sqft-min) P/D	Level of Service (LOS)
AM Peak Period Analysis					**Analysis Duration: 5 min.**												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	600	1.0	7.0	4,200	575	40	224	0.18	102.7	16.0	1,643	5,843	**160%**	**fails**
2	380	5.0	1,900	300	1.0	7.0	2,100	730	35	224	0.16	114.1	16.0	1,825	3,925	**207%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	600	1.0	3.0	1,800	575	40	198	0.20	116.2	11.0	1,278	3,078	84%	OK
2	380	5.0	1,900	300	1.0	3.0	900	730	35	198	0.18	129.0	11.0	1,419	2,319	**122%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	600	1.0	2.0	1,200	575	40	150	0.27	153.3	6.0	920	2,120	58%	OK
2	380	5.0	1,900	300	1.0	2.0	600	730	35	150	0.23	170.3	6.0	1,022	1,622	85%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,350	1.0	7.0	9,450	1,370	40	224	0.18	244.7	16.0	3,915	13,365	**122%**	**fails**
2	380	15.0	5,700	600	1.0	7.0	4,200	1,720	35	224	0.16	268.8	16.0	4,300	8,500	**149%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,350	1.0	3.0	4,050	1,370	40	198	0.20	276.8	11.0	3,044	7,094	65%	OK
2	380	15.0	5,700	600	1.0	3.0	1,800	1,720	35	198	0.18	304.0	11.0	3,344	5,144	90%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,350	1.0	2.0	2,700	1,370	40	150	0.27	365.3	6.0	2,192	4,892	45%	OK
2	380	15.0	5,700	600	1.0	2.0	1,200	1,720	35	150	0.23	401.3	6.0	2,408	3,608	63%	OK
PM Peak Period Analysis					**Analysis Duration: 5 min.**												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	150	1.0	7.0	1,050	560	40	224	0.18	100.0	16.0	1,600	2,650	73%	OK
2	380	5.0	1,900	75	1.0	7.0	525	530	35	224	0.16	82.8	16.0	1,325	1,850	97%	OK
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	150	1.0	3.0	450	560	40	198	0.20	113.1	11.0	1,244	1,694	46%	OK
2	380	5.0	1,900	75	1.0	3.0	225	530	35	198	0.18	93.7	11.0	1,031	1,256	66%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	150	1.0	2.0	300	560	40	150	0.27	149.3	6.0	896	1,196	33%	OK
2	380	5.0	1,900	75	1.0	2.0	150	530	35	150	0.23	123.7	6.0	742	892	47%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	338	1.0	7.0	2,363	1,375	40	224	0.18	245.6	16.0	3,929	6,291	57%	OK
2	380	15.0	5,700	150	1.0	7.0	1,050	1,495	35	224	0.16	233.6	16.0	3,738	4,788	84%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	338	1.0	3.0	1,013	1,375	40	198	0.20	277.8	11.0	3,056	4,068	37%	OK
2	380	15.0	5,700	150	1.0	3.0	450	1,495	35	198	0.18	264.3	11.0	2,907	3,357	59%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	338	1.0	2.0	675	1,375	40	150	0.27	366.7	6.0	2,200	2,875	26%	OK
2	380	15.0	5,700	150	1.0	2.0	300	1,495	35	150	0.23	348.8	6.0	2,093	2,393	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.

(2) Based on observations.

(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.

(4) Average walking distance across time-space zone.

(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.

(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.

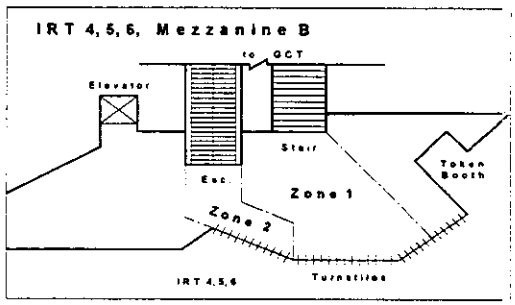


Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS – 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (pax) (7)	Average Wait Time (2) (min)	Average Walk Space (3) (sqft/pax)	Total Walk Time - Space (sqft-min) E * F * G	Total Pax Volume (pax) (7)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (pax-min) I * L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) B + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	631	1.0	7.0	4,414	575	40	224	0.18	102.7	16.0	1,643	6,057	**166%**	**fails**
2	380	5.0	1,900	315	1.0	7.0	2,207	685	35	224	0.16	107.0	16.0	1,713	3,920	**206%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	631	1.0	3.0	1,892	575	40	198	0.20	116.2	11.0	1,278	3,169	87%	OK
2	380	5.0	1,900	315	1.0	3.0	946	685	35	198	0.18	121.1	11.0	1,332	2,278	**120%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	631	1.0	2.0	1,261	575	40	150	0.27	153.3	6.0	920	2,181	60%	OK
2	380	5.0	1,900	315	1.0	2.0	631	685	35	150	0.23	159.8	6.0	959	1,590	84%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	7.0	9,931	1,475	40	224	0.18	263.4	16.0	4,215	14,146	**129%**	**fails**
2	380	15.0	5,700	631	1.0	7.0	4,414	1,725	35	224	0.16	269.6	16.0	4,313	8,727	**153%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	3.0	4,256	1,475	40	198	0.20	298.0	11.0	3,278	7,534	69%	OK
2	380	15.0	5,700	631	1.0	3.0	1,892	1,725	35	198	0.18	304.9	11.0	3,354	5,246	92%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	2.0	2,837	1,475	40	150	0.27	393.3	6.0	2,360	5,197	47%	OK
2	380	15.0	5,700	631	1.0	2.0	1,261	1,725	35	150	0.23	402.5	6.0	2,415	3,676	64%	OK
PM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	168	1.0	7.0	1,177	560	40	224	0.18	100.0	16.0	1,600	2,777	76%	OK
2	380	5.0	1,900	84	1.0	7.0	589	520	35	224	0.16	81.3	16.0	1,300	1,889	99%	OK
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	168	1.0	3.0	504	560	40	198	0.20	113.1	11.0	1,244	1,749	48%	OK
2	380	5.0	1,900	84	1.0	3.0	252	520	35	198	0.18	91.9	11.0	1,011	1,263	66%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	168	1.0	2.0	336	560	40	150	0.27	149.3	6.0	896	1,232	34%	OK
2	380	5.0	1,900	84	1.0	2.0	168	520	35	150	0.23	121.3	6.0	728	896	47%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	378	1.0	7.0	2,649	1,400	40	224	0.18	250.0	16.0	4,000	6,649	61%	OK
2	380	15.0	5,700	168	1.0	7.0	1,177	1,470	35	224	0.16	229.7	16.0	3,675	4,852	85%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	378	1.0	3.0	1,135	1,400	40	198	0.20	282.8	11.0	3,111	4,246	39%	OK
2	380	15.0	5,700	168	1.0	3.0	504	1,470	35	198	0.18	259.8	11.0	2,858	3,363	59%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	378	1.0	2.0	757	1,400	40	150	0.27	373.3	6.0	2,240	2,997	27%	OK
2	380	15.0	5,700	168	1.0	2.0	336	1,470	35	150	0.23	343.0	6.0	2,058	2,394	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.

(2) Based on observations.

(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.

(4) Average walking distance across time-space zone.

(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.

(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.

(7) In AM, uses "TA" growth factor since people queuing at stair/esc in Mezz B are coming from IRT subway; (for 2010, 1.0509; in 2020, 1.0993)
in PM, uses "MN" growth factor since people queuing at stair/esc in Mezz B are destined to MNR trains. (for 2010, 1.1211; in 2020, 1.244)

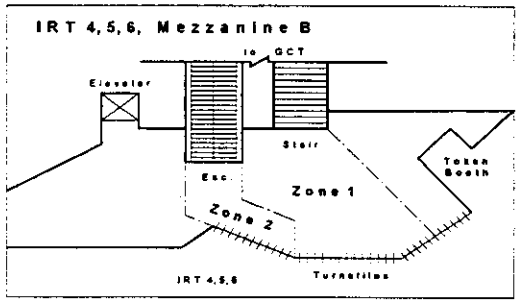


Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (pax) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (pax-min) I * L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	660	1.0	7.0	4,617	625	40	224	0.18	111.6	16.0	1,786	6,403	**175%**	**fails**
2	380	5.0	1,900	330	1.0	7.0	2,309	715	35	224	0.16	111.7	16.0	1,788	4,096	**216%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	660	1.0	3.0	1,979	625	40	198	0.20	126.3	11.0	1,389	3,368	92%	OK
2	380	5.0	1,900	330	1.0	3.0	989	715	35	198	0.18	126.4	11.0	1,390	2,380	**125%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	660	1.0	2.0	1,319	625	40	150	0.27	166.7	6.0	1,000	2,319	64%	OK
2	380	5.0	1,900	330	1.0	2.0	660	715	35	150	0.23	166.8	6.0	1,001	1,661	87%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	7.0	10,388	1,605	40	224	0.18	286.6	16.0	4,586	14,975	**137%**	**fails**
2	380	15.0	5,700	660	1.0	7.0	4,617	1,790	35	224	0.16	279.7	16.0	4,475	9,092	**160%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	3.0	4,452	1,605	40	198	0.20	324.2	11.0	3,567	8,019	73%	OK
2	380	15.0	5,700	660	1.0	3.0	1,979	1,790	35	198	0.18	316.4	11.0	3,481	5,459	96%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	2.0	2,968	1,605	40	150	0.27	428.0	6.0	2,568	5,536	51%	OK
2	380	15.0	5,700	660	1.0	2.0	1,319	1,790	35	150	0.23	417.7	6.0	2,506	3,825	67%	OK
PM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	187	1.0	7.0	1,306	590	40	224	0.18	105.4	16.0	1,686	2,992	82%	OK
2	380	5.0	1,900	93	1.0	7.0	653	560	35	224	0.16	87.5	16.0	1,400	2,053	**108%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	187	1.0	3.0	560	590	40	198	0.20	119.2	11.0	1,311	1,871	51%	OK
2	380	5.0	1,900	93	1.0	3.0	280	560	35	198	0.18	99.0	11.0	1,089	1,369	72%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	187	1.0	2.0	373	590	40	150	0.27	157.3	6.0	944	1,317	36%	OK
2	380	5.0	1,900	93	1.0	2.0	187	560	35	150	0.23	130.7	6.0	784	971	51%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	420	1.0	7.0	2,939	1,465	40	224	0.18	261.6	16.0	4,186	7,125	65%	OK
2	380	15.0	5,700	187	1.0	7.0	1,306	1,580	35	224	0.16	246.9	16.0	3,950	5,257	92%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	420	1.0	3.0	1,260	1,465	40	198	0.20	296.0	11.0	3,256	4,515	41%	OK
2	380	15.0	5,700	187	1.0	3.0	560	1,580	35	198	0.18	279.3	11.0	3,072	3,632	64%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	420	1.0	2.0	840	1,465	40	150	0.27	390.7	6.0	2,344	3,184	29%	OK
2	380	15.0	5,700	187	1.0	2.0	373	1,580	35	150	0.23	368.7	6.0	2,212	2,585	45%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) In AM, uses "TA" growth factor since people queuing at stair/esc in Mezz B are coming from IRT subway; (for 2010, 1.0509; in 2020, 1.0993)
in PM, uses "MN" growth factor since people queuing at stair/esc in Mezz B are destined to MNR trains. (for 2010, 1.1211; in 2020, 1.244)

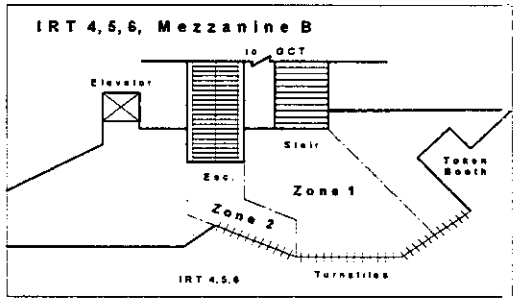


Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS – 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (pax) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (pax-min) I * L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis					**Analysis Duration: 5 min.**												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	631	1.0	7.0	4,414	575	40	224	0.18	102.7	16.0	1,643	6,057	**166%**	**fails**
2	380	5.0	1,900	315	1.0	7.0	2,207	730	35	224	0.16	114.1	16.0	1,825	4,032	**212%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	631	1.0	3.0	1,892	575	40	198	0.20	116.2	11.0	1,278	3,169	87%	OK
2	380	5.0	1,900	315	1.0	3.0	946	730	35	198	0.18	129.0	11.0	1,419	2,365	**124%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	631	1.0	2.0	1,261	575	40	150	0.27	153.3	6.0	920	2,181	60%	OK
2	380	5.0	1,900	315	1.0	2.0	631	730	35	*90*	0.39	283.9	*4.5*	1,278	1,908	100%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	7.0	9,931	1,370	40	224	0.18	244.7	16.0	3,915	13,846	**126%**	**fails**
2	380	15.0	5,700	631	1.0	7.0	4,414	1,720	35	224	0.16	268.8	16.0	4,300	8,714	**153%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	3.0	4,256	1,370	40	198	0.20	276.8	11.0	3,044	7,301	67%	OK
2	380	15.0	5,700	631	1.0	3.0	1,892	1,720	35	198	0.18	304.0	11.0	3,344	5,236	92%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	2.0	2,837	1,370	40	150	0.27	365.3	6.0	2,192	5,029	46%	OK
2	380	15.0	5,700	631	1.0	2.0	1,261	1,720	35	150	0.23	401.3	6.0	2,408	3,669	64%	OK
PM Peak Period Analysis					**Analysis Duration: 5 min.**												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	168	1.0	7.0	1,177	560	40	224	0.18	100.0	16.0	1,600	2,777	76%	OK
2	380	5.0	1,900	84	1.0	7.0	589	530	35	224	0.16	82.8	16.0	1,325	1,914	101%	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	168	1.0	3.0	504	560	40	198	0.20	113.1	11.0	1,244	1,749	48%	OK
2	380	5.0	1,900	84	1.0	3.0	252	530	35	198	0.18	93.7	11.0	1,031	1,283	68%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	168	1.0	2.0	336	560	40	150	0.27	149.3	6.0	896	1,232	34%	OK
2	380	5.0	1,900	84	1.0	2.0	168	530	35	150	0.23	123.7	6.0	742	910	48%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	355	1.0	7.0	2,483	1,375	40	224	0.18	245.6	16.0	3,929	6,412	59%	OK
2	380	15.0	5,700	158	1.0	7.0	1,103	1,495	35	224	0.16	233.6	16.0	3,738	4,841	85%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	355	1.0	3.0	1,064	1,375	40	198	0.20	277.8	11.0	3,056	4,120	38%	OK
2	380	15.0	5,700	158	1.0	3.0	473	1,495	35	198	0.18	264.3	11.0	2,907	3,380	59%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	355	1.0	2.0	709	1,375	40	150	0.27	366.7	6.0	2,200	2,909	27%	OK
2	380	15.0	5,700	158	1.0	2.0	315	1,495	35	150	0.23	348.8	6.0	2,093	2,408	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.

(2) Based on observations.

(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.

(4) Average walking distance across time-space zone.

(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.

(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.

(7) Uses No Build volumes and adds Build increment.

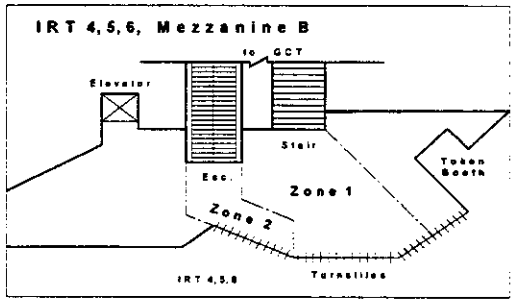


Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS – 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E*F*G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (ped-min) I*L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) H+O	Time-Space Required as % of Time-Space Available (sqft-min) P/D	Level of Service (LOS)
AM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	660	1.0	7.0	4,617	575	40	224	0.18	102.7	16.0	1,643	6,260	**172%**	**fails**
2	380	5.0	1,900	330	1.0	7.0	2,309	730	35	224	0.16	114.1	16.0	1,825	4,134	**218%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	660	1.0	3.0	1,979	575	40	198	0.20	116.2	11.0	1,278	3,257	89%	OK
2	380	5.0	1,900	330	1.0	3.0	989	730	35	198	0.18	129.0	11.0	1,419	2,409	**127%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	660	1.0	2.0	1,319	575	40	150	0.27	153.3	6.0	920	2,239	61%	OK
2	380	5.0	1,900	330	1.0	2.0	660	730	35	*90*	0.39	283.9	*4.5*	1,278	1,937	102%	**fails**
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	7.0	10,388	1,370	40	224	0.18	244.7	16.0	3,915	14,303	**131%**	**fails**
2	380	15.0	5,700	660	1.0	7.0	4,617	1,720	35	224	0.16	268.8	16.0	4,300	8,917	**156%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	3.0	4,452	1,370	40	198	0.20	276.8	11.0	3,044	7,497	68%	OK
2	380	15.0	5,700	660	1.0	3.0	1,979	1,720	35	198	0.18	304.0	11.0	3,344	5,323	93%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	2.0	2,968	1,370	40	150	0.27	365.3	6.0	2,192	5,160	47%	OK
2	380	15.0	5,700	660	1.0	2.0	1,319	1,720	35	150	0.23	401.3	6.0	2,408	3,727	65%	OK
PM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	187	1.0	7.0	1,306	560	40	224	0.18	100.0	16.0	1,600	2,906	80%	OK
2	380	5.0	1,900	93	1.0	7.0	653	530	35	224	0.16	82.8	16.0	1,325	1,978	104%	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	187	1.0	3.0	560	560	40	198	0.20	113.1	11.0	1,244	1,804	49%	OK
2	380	5.0	1,900	93	1.0	3.0	280	530	35	198	0.18	93.7	11.0	1,031	1,310	69%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	187	1.0	2.0	373	560	40	150	0.27	149.3	6.0	896	1,269	35%	OK
2	380	5.0	1,900	93	1.0	2.0	187	530	35	150	0.23	123.7	6.0	742	929	49%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	420	1.0	7.0	2,939	1,375	40	224	0.18	245.6	16.0	3,929	6,868	63%	OK
2	380	15.0	5,700	187	1.0	7.0	1,306	1,495	35	224	0.16	233.6	16.0	3,738	5,044	88%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	420	1.0	3.0	1,260	1,375	40	198	0.20	277.8	11.0	3,056	4,315	39%	OK
2	380	15.0	5,700	187	1.0	3.0	560	1,495	35	198	0.18	264.3	11.0	2,907	3,467	61%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	420	1.0	2.0	840	1,375	40	150	0.27	366.7	6.0	2,200	3,040	28%	OK
2	380	15.0	5,700	187	1.0	2.0	373	1,495	35	150	0.23	348.8	6.0	2,093	2,466	43%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

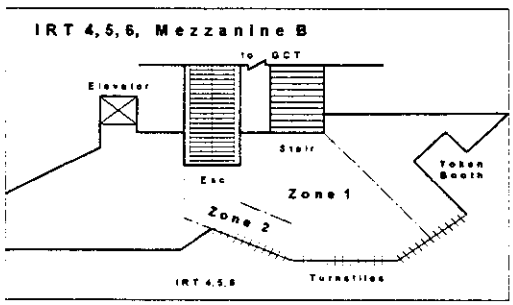


Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS – 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (pax) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (pax-min) I * L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	631	1.0	7.0	4,414	675	40	224	0.18	120.5	16.0	1,929	6,343	85%	OK
2	500	5.0	2,500	315	1.0	7.0	2,207	830	35	224	0.16	129.7	16.0	2,075	4,282	**171%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	631	1.0	3.0	1,892	675	40	198	0.20	136.4	11.0	1,500	3,392	45%	OK
2	500	5.0	2,500	315	1.0	3.0	946	830	35	198	0.18	146.7	11.0	1,614	2,560	**102%**	**fails**
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	631	1.0	2.0	1,261	675	40	150	0.27	180.0	6.0	1,080	2,341	31%	OK
2	500	5.0	2,500	315	1.0	2.0	631	830	35	150	0.23	193.7	6.0	1,162	1,793	72%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	1,419	1.0	7.0	9,931	1,680	40	224	0.18	300.0	16.0	4,800	14,731	65%	OK
2	500	15.0	7,500	631	1.0	7.0	4,414	2,055	35	224	0.16	321.1	16.0	5,138	9,552	**127%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	1,419	1.0	3.0	4,256	1,680	40	198	0.20	339.4	11.0	3,733	7,989	36%	OK
2	500	15.0	7,500	631	1.0	3.0	1,892	2,055	35	198	0.18	363.3	11.0	3,996	5,887	78%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	1,419	1.0	2.0	2,837	1,680	40	150	0.27	448.0	6.0	2,688	5,525	25%	OK
2	500	15.0	7,500	631	1.0	2.0	1,261	2,055	35	150	0.23	479.5	6.0	2,877	4,138	55%	OK
PM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	168	1.0	7.0	1,177	655	40	224	0.18	117.0	16.0	1,872	3,049	41%	OK
2	500	5.0	2,500	84	1.0	7.0	589	640	35	224	0.16	100.0	16.0	1,600	2,189	88%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	168	1.0	3.0	504	655	40	198	0.20	132.3	11.0	1,456	1,960	26%	OK
2	500	5.0	2,500	84	1.0	3.0	252	640	35	198	0.18	113.1	11.0	1,244	1,497	60%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	168	1.0	2.0	336	655	40	150	0.27	174.7	6.0	1,048	1,384	18%	OK
2	500	5.0	2,500	84	1.0	2.0	168	640	35	150	0.23	149.3	6.0	896	1,064	43%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	378	1.0	7.0	2,649	1,660	40	224	0.18	296.5	16.0	4,743	7,392	33%	OK
2	500	15.0	7,500	168	1.0	7.0	1,177	1,845	35	224	0.16	288.3	16.0	4,613	5,790	77%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	378	1.0	3.0	1,135	1,660	40	198	0.20	335.4	11.0	3,689	4,824	21%	OK
2	500	15.0	7,500	168	1.0	3.0	504	1,845	35	198	0.18	326.1	11.0	3,588	4,092	55%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	378	1.0	2.0	757	1,660	40	150	0.27	442.7	6.0	2,656	3,413	15%	OK
2	500	15.0	7,500	168	1.0	2.0	336	1,845	35	150	0.23	430.5	6.0	2,583	2,919	39%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

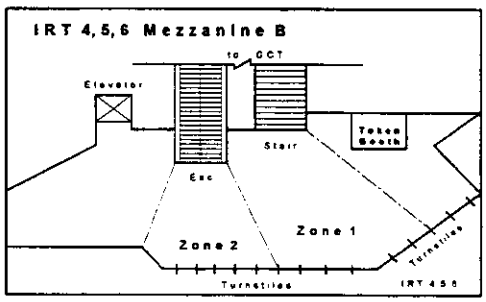


Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS – 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (pax) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (sqft-min) I * L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	660	1.0	7.0	4,617	740	40	224	0.18	132.2	16.0	2,114	6,732	90%	OK
2	500	5.0	2,500	330	1.0	7.0	2,309	860	35	224	0.16	134.4	16.0	2,150	4,459	**178%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	660	1.0	3.0	1,979	740	40	198	0.20	149.5	11.0	1,644	3,623	48%	OK
2	500	5.0	2,500	330	1.0	3.0	989	860	35	198	0.18	152.0	11.0	1,672	2,662	**106%**	**fails**
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	660	1.0	2.0	1,319	740	40	150	0.27	197.3	6.0	1,184	2,503	33%	OK
2	500	5.0	2,500	330	1.0	2.0	660	860	35	150	0.23	200.7	6.0	1,204	1,864	75%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	1,484	1.0	7.0	10,388	1,790	40	224	0.18	319.7	16.0	5,115	15,503	69%	OK
2	500	15.0	7,500	660	1.0	7.0	4,617	2,265	35	224	0.16	353.9	16.0	5,663	10,280	**137%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	1,484	1.0	3.0	4,452	1,790	40	198	0.20	361.6	11.0	3,978	8,430	37%	OK
2	500	15.0	7,500	660	1.0	3.0	1,979	2,265	35	198	0.18	400.4	11.0	4,404	6,383	85%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	1,484	1.0	2.0	2,968	1,790	40	150	0.27	477.3	6.0	2,864	5,832	26%	OK
2	500	15.0	7,500	660	1.0	2.0	1,319	2,265	35	150	0.23	528.5	6.0	3,171	4,490	60%	OK
PM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	187	1.0	7.0	1,306	690	40	224	0.18	123.2	16.0	1,972	3,278	44%	OK
2	500	5.0	2,500	93	1.0	7.0	653	680	35	224	0.16	106.3	16.0	1,700	2,353	94%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	187	1.0	3.0	560	690	40	198	0.20	139.4	11.0	1,533	2,093	28%	OK
2	500	5.0	2,500	93	1.0	3.0	280	680	35	198	0.18	120.2	11.0	1,322	1,602	64%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	187	1.0	2.0	373	690	40	150	0.27	184.0	6.0	1,104	1,477	20%	OK
2	500	5.0	2,500	93	1.0	2.0	187	680	35	150	0.23	158.7	6.0	952	1,139	46%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	420	1.0	7.0	2,939	1,745	40	224	0.18	311.6	16.0	4,986	7,925	35%	OK
2	500	15.0	7,500	187	1.0	7.0	1,306	1,960	35	224	0.16	306.3	16.0	4,900	6,207	83%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	420	1.0	3.0	1,260	1,745	40	198	0.20	352.5	11.0	3,878	5,137	23%	OK
2	500	15.0	7,500	187	1.0	3.0	560	1,960	35	198	0.18	346.5	11.0	3,811	4,371	58%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	420	1.0	2.0	840	1,745	40	150	0.27	465.3	6.0	2,792	3,632	16%	OK
2	500	15.0	7,500	187	1.0	2.0	373	1,960	35	150	0.23	457.3	6.0	2,744	3,117	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

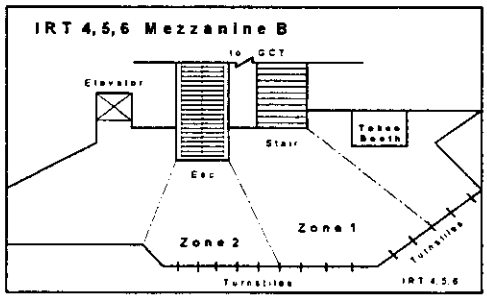


TABLE M-16

EXISTING
SUBWAY STAIRS
ANALYSES

Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	325	230	555	11.0	10.0	10	90	1.23	D
2 (P14)	170	445	615	11.0	10.0	20	80	1.54	E
3 (P18)	290	270	560	11.0	10.0	10	90	1.24	D
4 (P20)	245	195	440	11.0	10.0	10	90	0.98	C
5 (P22)	235	135	370	6.5	5.5	10	50	1.49	E
6 (P23)	360	45	405	6.5	5.5	20	44	1.84	F
7 (P21)	280	25	305	11.0	10.0	20	80	0.76	C
8 (P19)	200	120	320	11.0	10.0	10	90	0.71	C
9 (P17)	110	130	240	11.0	10.0	10	90	0.53	B
10 (P15)	70	100	170	11.0	10.0	10	90	0.38	A
11 (P13)	165	35	200	11.0	10.0	20	80	0.50	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

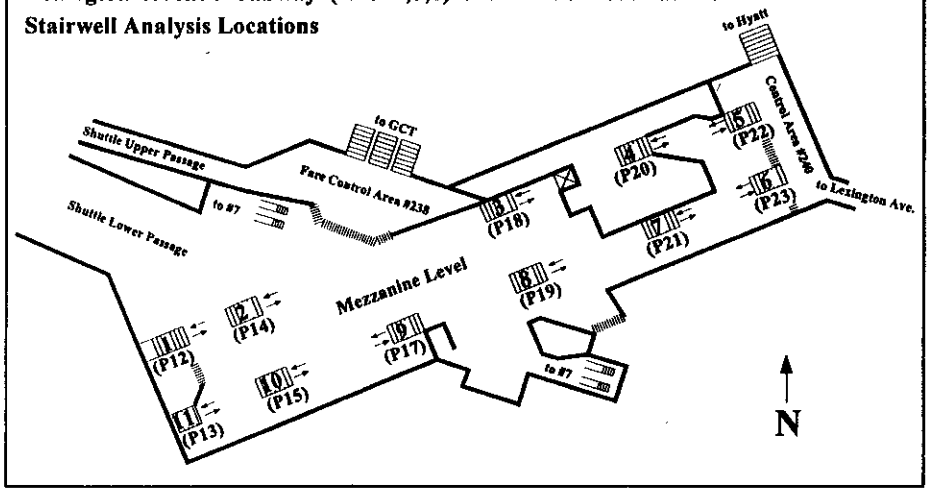


Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	815	605	1,420	11.0	10.0	10	90	1.05	D
2 (P14)	430	1,145	1,575	11.0	10.0	20	80	1.31	D
3 (P18)	665	645	1,310	11.0	10.0	10	90	0.97	C
4 (P20)	675	570	1,245	11.0	10.0	10	90	0.92	C
5 (P22)	565	340	905	6.5	5.5	10	50	1.22	D
6 (P23)	915	125	1,040	6.5	5.5	20	44	1.58	E
7 (P21)	690	70	760	11.0	10.0	20	80	0.63	B
8 (P19)	565	290	855	11.0	10.0	10	90	0.63	B
9 (P17)	300	350	650	11.0	10.0	10	90	0.48	B
10 (P15)	185	260	445	11.0	10.0	10	90	0.33	A
11 (P13)	455	65	520	11.0	10.0	20	80	0.43	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

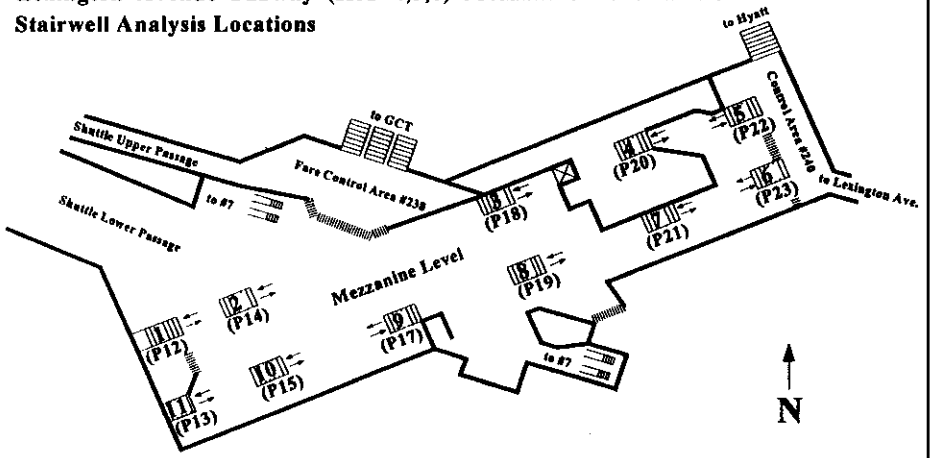


Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	65	115	180	11.0	10.0	10	90	0.40	A
2 (P14)	60	310	370	11.0	10.0	20	80	0.93	C
3 (P18)	110	105	215	11.0	10.0	10	90	0.48	B
4 (P20)	50	165	215	11.0	10.0	20	80	0.54	B
5 (P22)	35	245	280	6.5	5.5	20	44	1.27	D
6 (P23)	210	210	420	6.5	5.5	10	50	1.70	F
7 (P21)	210	115	325	11.0	10.0	10	90	0.72	C
8 (P19)	110	130	240	11.0	10.0	10	90	0.53	B
9 (P17)	170	185	355	11.0	10.0	10	90	0.79	C
10 (P15)	140	170	310	11.0	10.0	10	90	0.69	B
11 (P13)	170	200	370	11.0	10.0	10	90	0.82	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

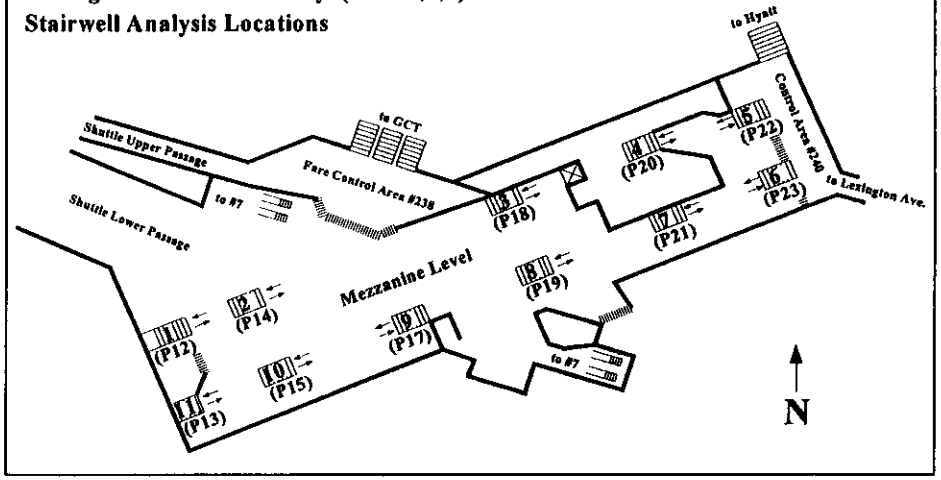


Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	165	285	450	11.0	10.0	10	90	0.33	A
2 (P14)	165	870	1,035	11.0	10.0	20	80	0.86	C
3 (P18)	280	295	575	11.0	10.0	10	90	0.43	A
4 (P20)	120	420	540	11.0	10.0	20	80	0.45	B
5 (P22)	70	680	750	6.5	5.5	20	44	1.14	D
6 (P23)	520	350	870	6.5	5.5	10	50	1.17	D
7 (P21)	540	275	815	11.0	10.0	10	90	0.60	B
8 (P19)	250	365	615	11.0	10.0	10	90	0.46	B
9 (P17)	410	520	930	11.0	10.0	10	90	0.69	B
10 (P15)	320	455	775	11.0	10.0	10	90	0.57	B
11 (P13)	365	470	835	11.0	10.0	10	90	0.62	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

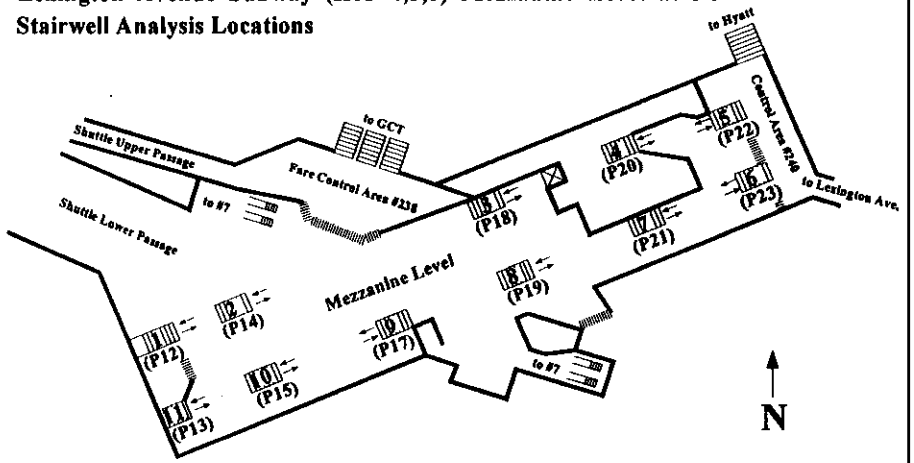


TABLE M-17

2010 NO BUILD SUBWAY STAIRS ANALYSES

Table M - 17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	340	255	595	11.0	10.0	10	90	1.32	D
2 (P14)	180	500	680	11.0	10.0	20	80	1.70	F
3 (P18)	305	305	610	11.0	10.0	10	90	1.36	E
4 (P20)	255	220	475	11.0	10.0	10	90	1.06	D
5 (P22)	245	150	395	6.5	5.5	10	50	1.60	E
6 (P23)	380	50	430	6.5	5.5	20	44	1.95	F
7 (P21)	295	30	325	11.0	10.0	20	80	0.81	C
8 (P19)	210	135	345	11.0	10.0	10	90	0.77	C
9 (P17)	115	145	260	11.0	10.0	10	90	0.58	B
10 (P15)	75	110	185	11.0	10.0	10	90	0.41	A
11 (P13)	175	40	215	11.0	10.0	20	80	0.54	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

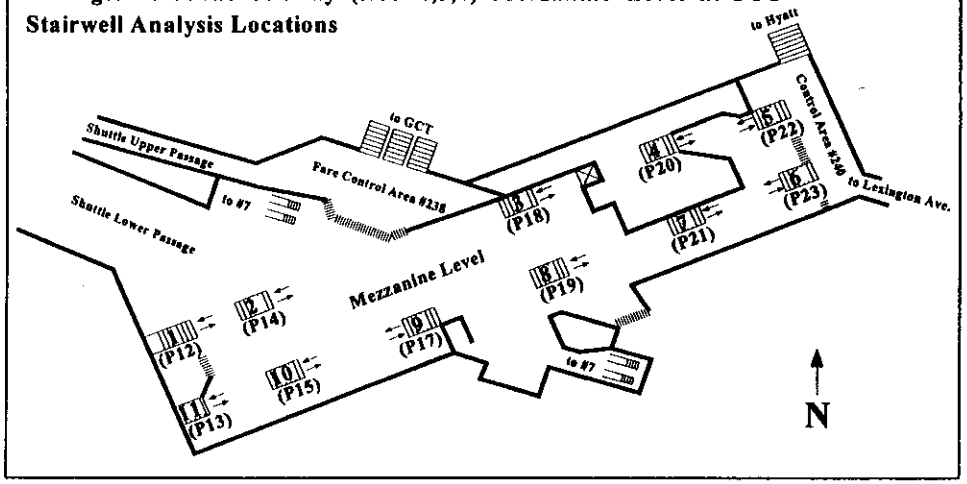


Table M -17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	855	680	1,535	11.0	10.0	10	90	1.14	D
2 (P14)	450	1,285	1,735	11.0	10.0	20	80	1.45	E
3 (P18)	700	725	1,425	11.0	10.0	10	90	1.06	D
4 (P20)	710	640	1,350	11.0	10.0	10	90	1.00	D
5 (P22)	595	380	975	6.5	5.5	10	50	1.31	D
6 (P23)	960	140	1,100	6.5	5.5	20	44	1.67	E
7 (P21)	725	80	805	11.0	10.0	20	80	0.67	B
8 (P19)	590	325	915	11.0	10.0	10	90	0.68	B
9 (P17)	315	400	715	11.0	10.0	10	90	0.53	B
10 (P15)	195	290	485	11.0	10.0	10	90	0.36	A
11 (P13)	475	70	545	11.0	10.0	20	80	0.45	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

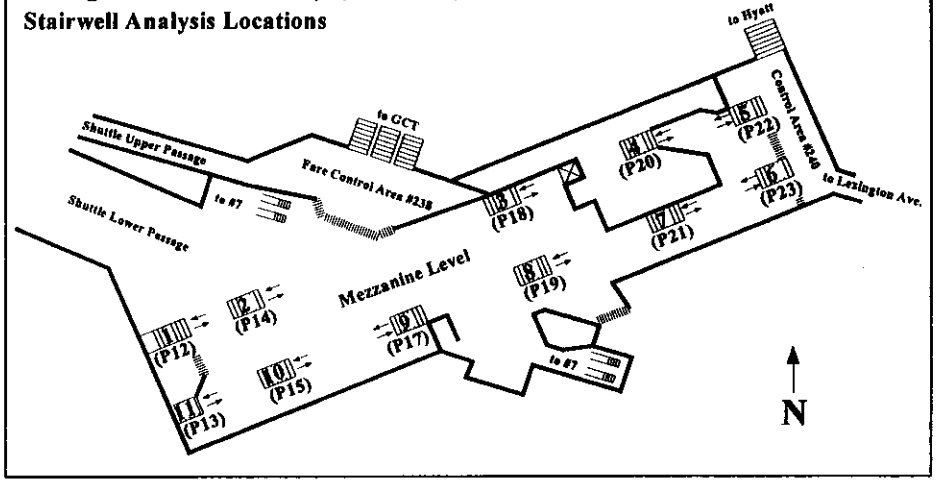


Table M - 17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	70	120	190	11.0	10.0	10	90	0.42	A
2 (P14)	65	330	395	11.0	10.0	20	80	0.99	C
3 (P18)	120	110	230	11.0	10.0	10	90	0.51	B
4 (P20)	55	170	225	11.0	10.0	20	80	0.56	B
5 (P22)	40	260	300	6.5	5.5	20	44	1.36	E
6 (P23)	235	220	455	6.5	5.5	10	50	1.84	F
7 (P21)	235	120	355	11.0	10.0	10	90	0.79	C
8 (P19)	125	135	260	11.0	10.0	10	90	0.58	B
9 (P17)	195	195	390	11.0	10.0	10	90	0.87	C
10 (P15)	155	175	330	11.0	10.0	10	90	0.73	C
11 (P13)	190	210	400	11.0	10.0	10	90	0.89	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

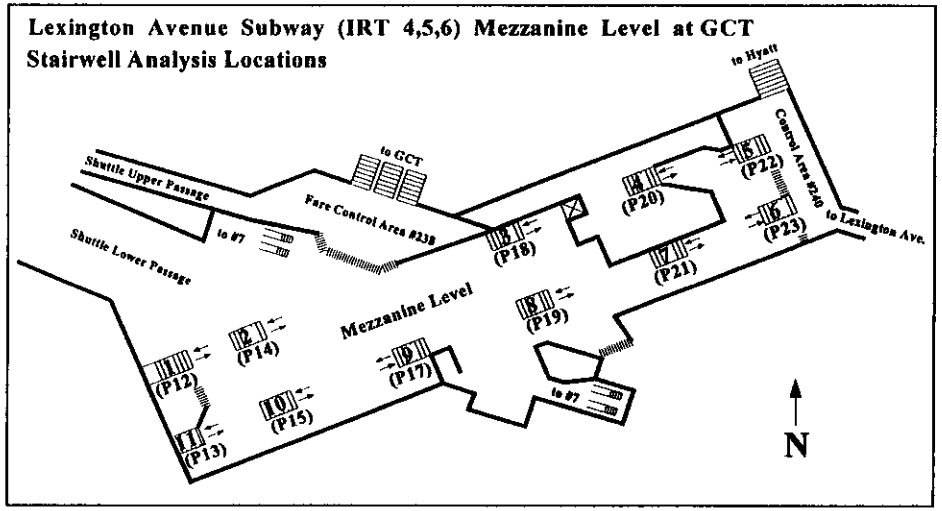


Table M - 17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	185	300	485	11.0	10.0	10	90	0.36	A
2 (P14)	185	915	1,100	11.0	10.0	20	80	0.92	C
3 (P18)	315	310	625	11.0	10.0	10	90	0.46	B
4 (P20)	135	440	575	11.0	10.0	20	80	0.48	B
5 (P22)	80	715	795	6.5	5.5	20	44	1.20	D
6 (P23)	585	365	950	6.5	5.5	10	50	1.28	D
7 (P21)	610	285	895	11.0	10.0	20	80	0.75	C
8 (P19)	285	380	665	11.0	10.0	10	90	0.49	B
9 (P17)	460	550	1,010	11.0	10.0	10	90	0.75	C
10 (P15)	360	480	840	11.0	10.0	10	90	0.62	B
11 (P13)	410	495	905	11.0	10.0	10	90	0.67	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

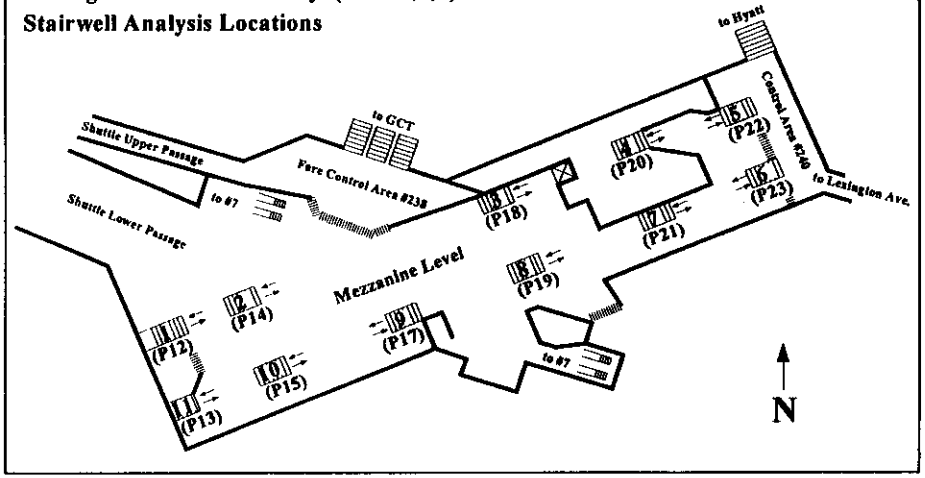


TABLE M-18

2020 NO BUILD
SUBWAY STAIRS
ANALYSES

Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	365	285	650	11.0	10.0	10	90	1.44	E
2 (P14)	185	550	735	11.0	10.0	20	80	1.84	F
3 (P18)	320	335	655	11.0	10.0	10	90	1.46	E
4 (P20)	270	245	515	11.0	10.0	10	90	1.14	D
5 (P22)	260	170	430	6.5	5.5	10	50	1.74	F
6 (P23)	395	55	450	6.5	5.5	20	44	2.05	F
7 (P21)	305	30	335	11.0	10.0	20	80	0.84	C
8 (P19)	220	150	370	11.0	10.0	10	90	0.82	C
9 (P17)	120	160	280	11.0	10.0	10	90	0.62	B
10 (P15)	70	125	195	11.0	10.0	10	90	0.43	A
11 (P13)	170	40	210	11.0	10.0	20	80	0.53	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

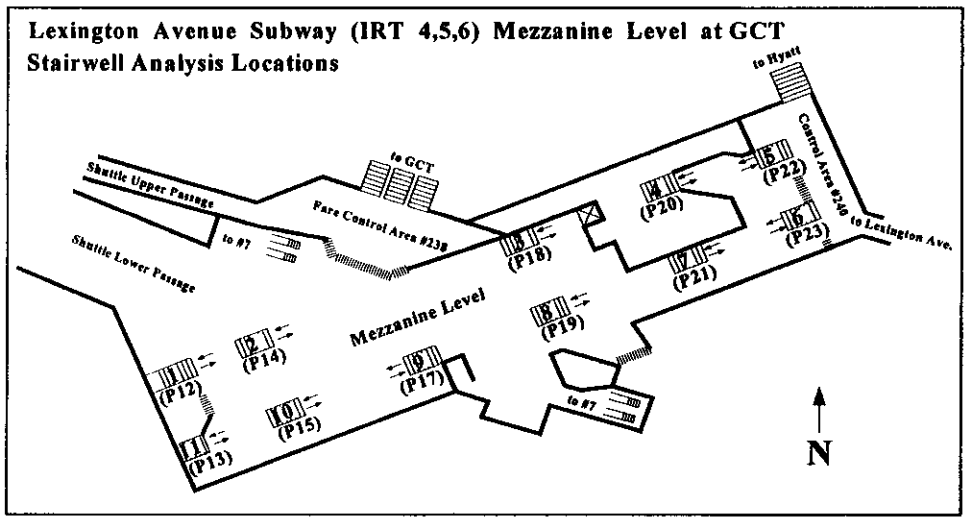


Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	895	750	1,645	11.0	10.0	10	90	1.22	D
2 (P14)	470	1,425	1,895	11.0	10.0	20	80	1.58	E
3 (P18)	730	805	1,535	11.0	10.0	10	90	1.14	D
4 (P20)	740	710	1,450	11.0	10.0	10	90	1.07	D
5 (P22)	620	425	1,045	6.5	5.5	10	50	1.41	E
6 (P23)	1,005	155	1,160	6.5	5.5	20	44	1.76	F
7 (P21)	760	85	845	11.0	10.0	20	80	0.70	C
8 (P19)	625	360	985	11.0	10.0	10	90	0.73	C
9 (P17)	330	450	780	11.0	10.0	10	90	0.58	B
10 (P15)	200	325	525	11.0	10.0	10	90	0.39	A
11 (P13)	500	80	580	11.0	10.0	20	80	0.48	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

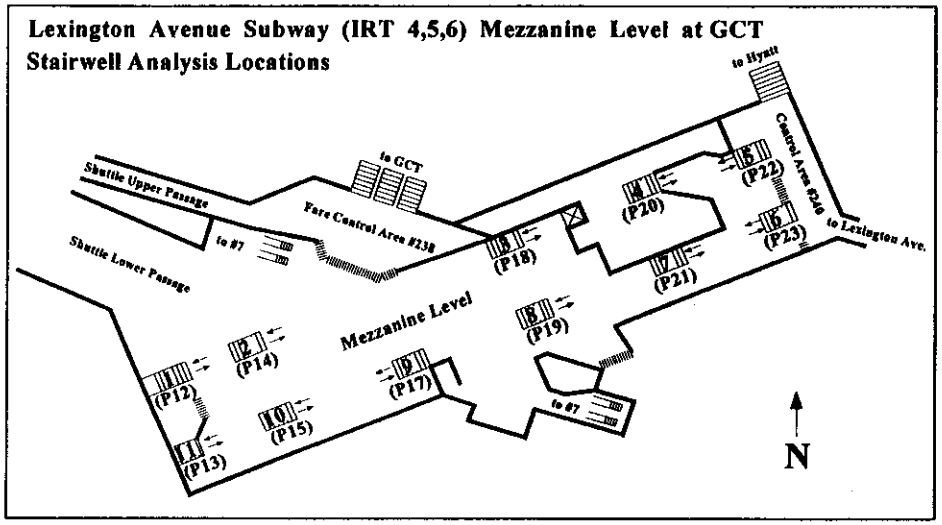


Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	80	125	205	11.0	10.0	10	90	0.46	B
2 (P14)	70	340	410	11.0	10.0	20	80	1.03	D
3 (P18)	135	115	250	11.0	10.0	10	90	0.56	B
4 (P20)	60	180	240	11.0	10.0	20	80	0.60	B
5 (P22)	40	270	310	6.5	5.5	20	44	1.41	E
6 (P23)	265	230	495	6.5	5.5	10	50	2.00	F
7 (P21)	265	125	390	11.0	10.0	20	80	0.98	C
8 (P19)	140	145	285	11.0	10.0	10	90	0.63	B
9 (P17)	210	200	410	11.0	10.0	10	90	0.91	C
10 (P15)	175	185	360	11.0	10.0	10	90	0.80	C
11 (P13)	210	220	430	11.0	10.0	10	90	0.96	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

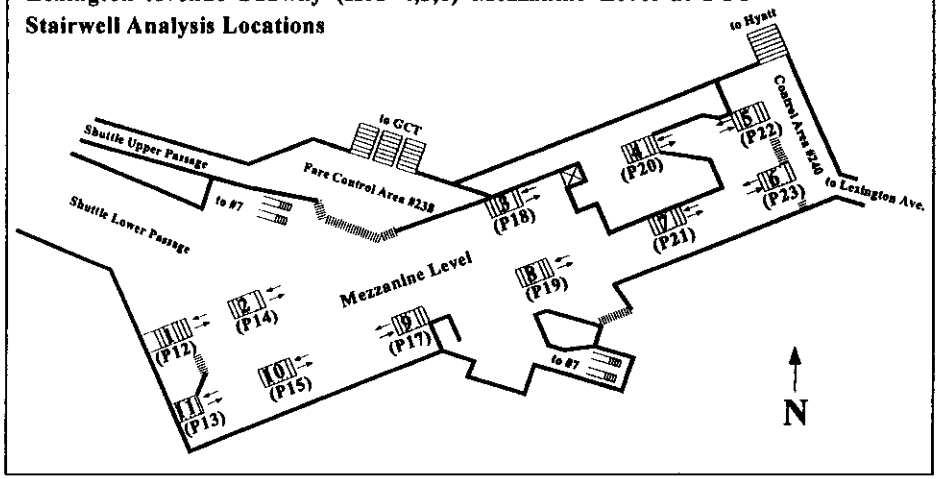


Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	205	310	515	11.0	10.0	10	90	0.38	A
2 (P14)	205	955	1,160	11.0	10.0	20	80	0.97	C
3 (P18)	345	325	670	11.0	10.0	10	90	0.50	B
4 (P20)	150	465	615	11.0	10.0	20	80	0.51	B
5 (P22)	85	750	835	6.5	5.5	20	44	1.27	D
6 (P23)	650	385	1,035	6.5	5.5	10	50	1.39	E
7 (P21)	670	305	975	11.0	10.0	20	80	0.81	C
8 (P19)	310	400	710	11.0	10.0	10	90	0.53	B
9 (P17)	510	570	1,080	11.0	10.0	10	90	0.80	C
10 (P15)	395	500	895	11.0	10.0	10	90	0.66	B
11 (P13)	450	515	965	11.0	10.0	10	90	0.71	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

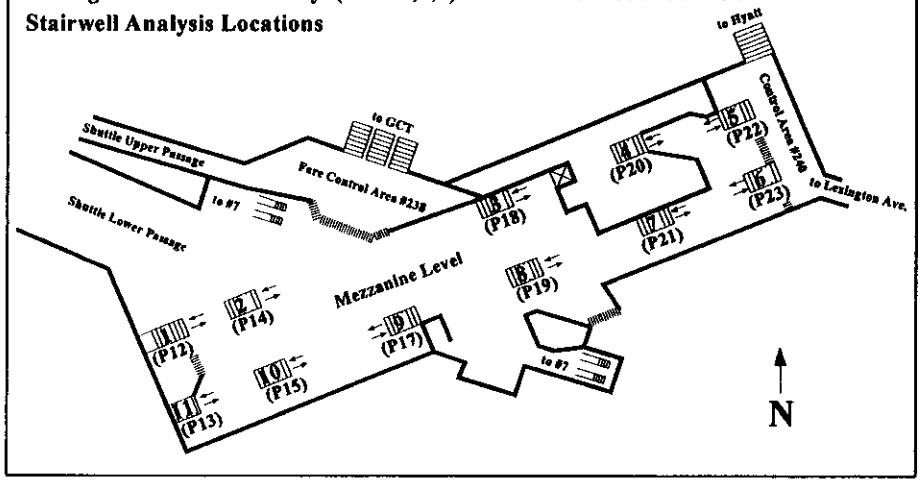


TABLE M-19

2010 BUILD
SUBWAY STAIRS
ANALYSES

Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	340	305	645	11.0	10.0	10	90	1.43	E	*
2 (P14)	180	590	770	11.0	10.0	20	80	1.93	F	*
3 (P18)	305	365	670	11.0	10.0	10	90	1.49	E	*
4 (P20)	255	230	485	11.0	10.0	10	90	1.08	D	
5 (P22)	245	160	405	6.5	5.5	10	50	1.64	E	
6 (P23)	380	55	435	6.5	5.5	20	44	1.98	F	
7 (P21)	295	35	330	11.0	10.0	20	80	0.83	C	
8 (P19)	210	160	370	11.0	10.0	10	90	0.82	C	
9 (P17)	115	175	290	11.0	10.0	10	90	0.64	B	
10 (P15)	75	130	205	11.0	10.0	10	90	0.46	B	
11 (P13)	175	50	225	11.0	10.0	20	80	0.56	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

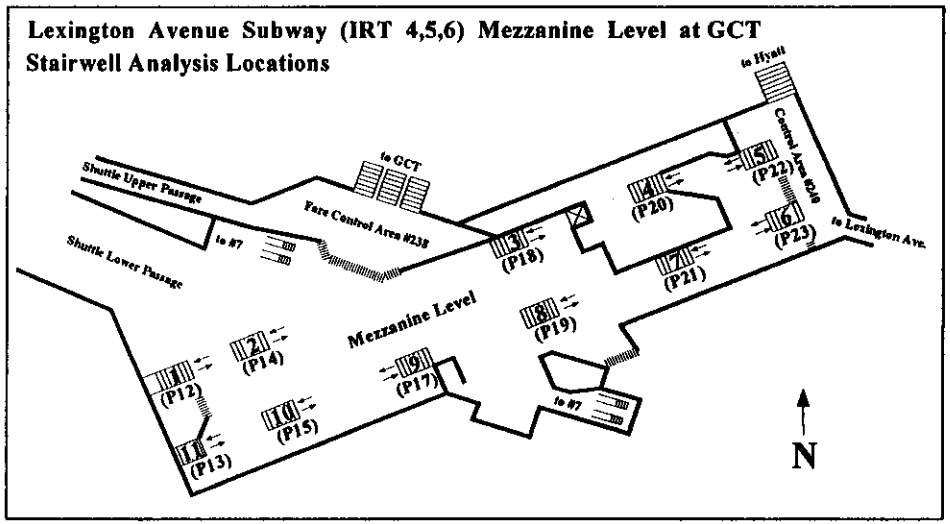


Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	855	825	1,680	11.0	10.0	10	90	1.24	D	*
2 (P14)	450	1,560	2,010	11.0	10.0	20	80	1.68	F	*
3 (P18)	700	880	1,580	11.0	10.0	10	90	1.17	D	*
4 (P20)	710	675	1,385	11.0	10.0	10	90	1.03	D	
5 (P22)	595	400	995	6.5	5.5	10	50	1.34	E	
6 (P23)	960	155	1,115	6.5	5.5	20	44	1.69	F	
7 (P21)	725	90	815	11.0	10.0	20	80	0.68	B	
8 (P19)	590	395	985	11.0	10.0	10	90	0.73	C	
9 (P17)	315	485	800	11.0	10.0	10	90	0.59	B	
10 (P15)	195	355	550	11.0	10.0	10	90	0.41	A	
11 (P13)	475	90	565	11.0	10.0	20	80	0.47	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

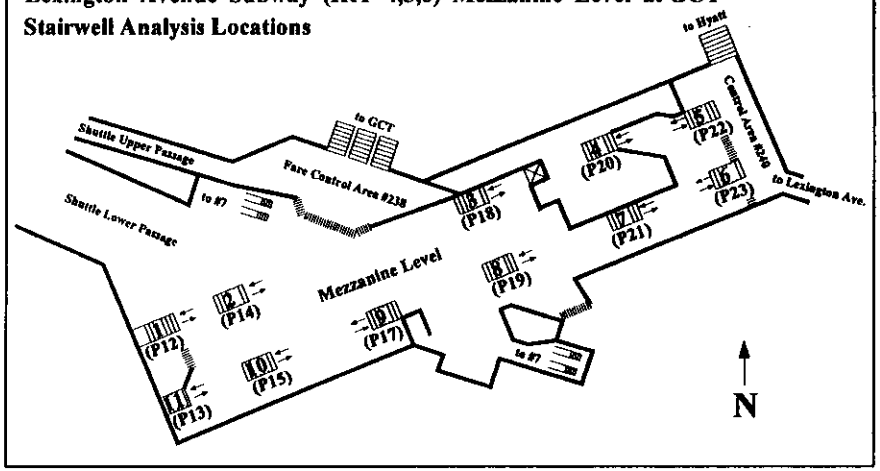


Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	90	120	210	11.0	10.0	10	90	0.47	B
2 (P14)	85	330	415	11.0	10.0	20	80	1.04	D
3 (P18)	150	110	260	11.0	10.0	10	90	0.58	B
4 (P20)	60	170	230	11.0	10.0	20	80	0.58	B
5 (P22)	45	260	305	6.5	5.5	20	44	1.39	E
6 (P23)	245	220	465	6.5	5.5	10	50	1.88	F
7 (P21)	245	120	365	11.0	10.0	20	80	0.91	C
8 (P19)	155	135	290	11.0	10.0	10	90	0.64	B
9 (P17)	245	195	440	11.0	10.0	10	90	0.98	C
10 (P15)	195	175	370	11.0	10.0	10	90	0.82	C
11 (P13)	240	210	450	11.0	10.0	10	90	1.00	D

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"* *" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

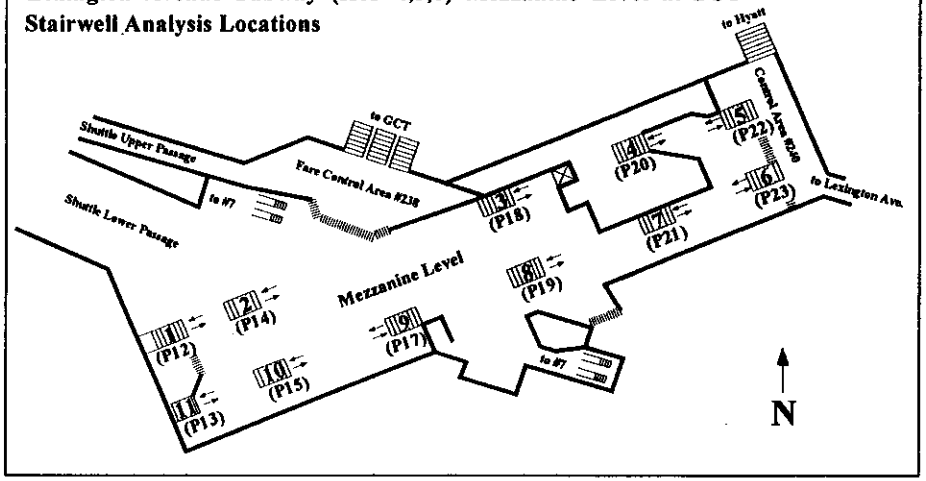


Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	240	300	540	11.0	10.0	10	90	0.40	A
2 (P14)	240	915	1,155	11.0	10.0	20	80	0.96	C
3 (P18)	405	310	715	11.0	10.0	10	90	0.53	B
4 (P20)	150	440	590	11.0	10.0	20	80	0.49	B
5 (P22)	90	715	805	6.5	5.5	20	44	1.22	D
6 (P23)	610	365	975	6.5	5.5	10	50	1.31	D
7 (P21)	635	285	920	11.0	10.0	20	80	0.77	C
8 (P19)	380	380	760	11.0	10.0	10	90	0.56	B
9 (P17)	605	550	1,155	11.0	10.0	10	90	0.86	C
10 (P15)	480	480	960	11.0	10.0	10	90	0.71	C
11 (P13)	545	495	1,040	11.0	10.0	10	90	0.77	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

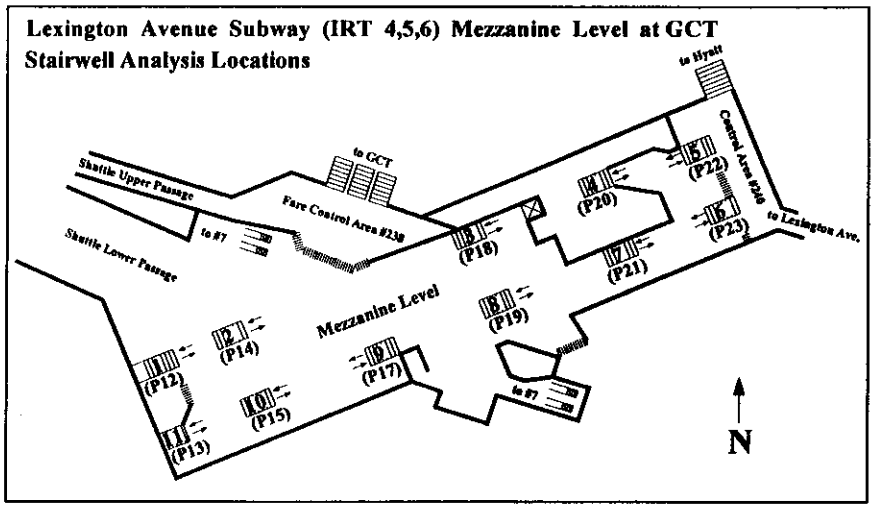


TABLE M-20

2020 BUILD
SUBWAY STAIRS
ANALYSES

Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	365	335	700	11.0	10.0	10	90	1.56	E	*
2 (P14)	185	645	830	11.0	10.0	20	80	2.08	F	*
3 (P18)	320	395	715	11.0	10.0	10	90	1.59	E	*
4 (P20)	270	260	530	11.0	10.0	10	90	1.18	D	
5 (P22)	260	180	440	6.5	5.5	10	50	1.78	F	
6 (P23)	395	60	455	6.5	5.5	20	44	2.07	F	
7 (P21)	305	35	340	11.0	10.0	20	80	0.85	C	
8 (P19)	220	175	395	11.0	10.0	10	90	0.88	C	
9 (P17)	120	190	310	11.0	10.0	10	90	0.69	B	
10 (P15)	70	150	220	11.0	10.0	20	80	0.55	B	
11 (P13)	170	50	220	11.0	10.0	20	80	0.55	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

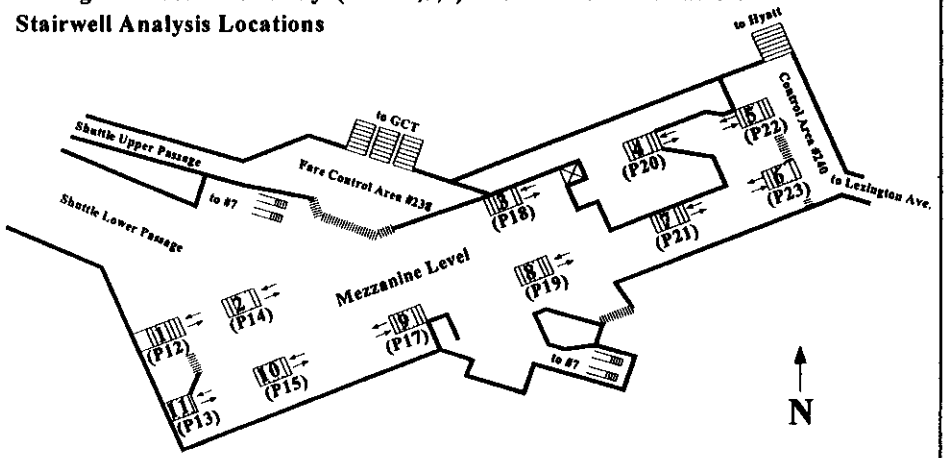


Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	895	900	1,795	11.0	10.0	10	90	1.33	D	*
2 (P14)	470	1,710	2,180	11.0	10.0	20	80	1.82	F	*
3 (P18)	730	965	1,695	11.0	10.0	10	90	1.26	D	*
4 (P20)	740	745	1,485	11.0	10.0	10	90	1.10	D	
5 (P22)	620	445	1,065	6.5	5.5	10	50	1.43	E	
6 (P23)	1,005	170	1,175	6.5	5.5	20	44	1.78	F	
7 (P21)	760	95	855	11.0	10.0	20	80	0.71	C	
8 (P19)	625	430	1,055	11.0	10.0	10	90	0.78	C	
9 (P17)	330	535	865	11.0	10.0	10	90	0.64	B	
10 (P15)	200	390	590	11.0	10.0	10	90	0.44	A	
11 (P13)	500	100	600	11.0	10.0	20	80	0.50	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

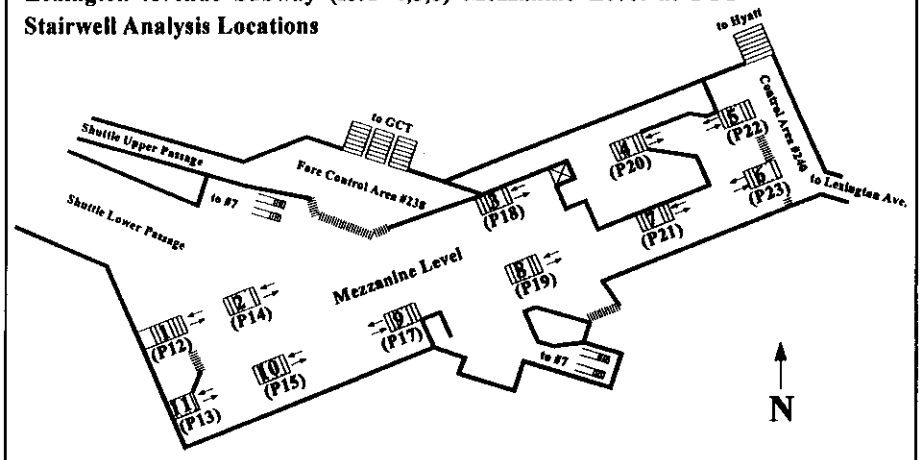


Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	100	125	225	11.0	10.0	10	90	0.50	B	
2 (P14)	90	340	430	11.0	10.0	20	80	1.08	D	
3 (P18)	170	115	285	11.0	10.0	10	90	0.63	B	
4 (P20)	65	180	245	11.0	10.0	20	80	0.61	B	
5 (P22)	45	270	315	6.5	5.5	20	44	1.43	E	
6 (P23)	270	230	500	6.5	5.5	10	50	2.02	F	
7 (P21)	275	125	400	11.0	10.0	20	80	1.00	D	
8 (P19)	175	145	320	11.0	10.0	10	90	0.71	C	
9 (P17)	260	200	460	11.0	10.0	10	90	1.02	D	*
10 (P15)	220	185	405	11.0	10.0	10	90	0.90	C	
11 (P13)	260	220	480	11.0	10.0	10	90	1.07	D	*

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

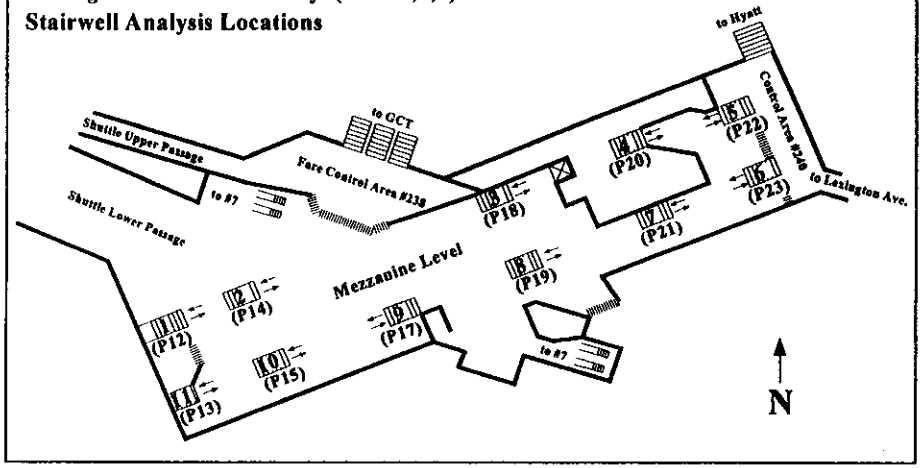


Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	260	310	570	11.0	10.0	10	90	0.42	A
2 (P14)	260	955	1,215	11.0	10.0	20	80	1.01	D
3 (P18)	440	325	765	11.0	10.0	10	90	0.57	B
4 (P20)	165	465	630	11.0	10.0	20	80	0.53	B
5 (P22)	95	750	845	6.5	5.5	20	44	1.28	D
6 (P23)	675	385	1,060	6.5	5.5	10	50	1.43	E
7 (P21)	695	305	1,000	11.0	10.0	20	80	0.83	C
8 (P19)	410	400	810	11.0	10.0	10	90	0.60	B
9 (P17)	660	570	1,230	11.0	10.0	10	90	0.91	C
10 (P15)	515	500	1,015	11.0	10.0	10	90	0.75	C
11 (P13)	585	515	1,100	11.0	10.0	10	90	0.81	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

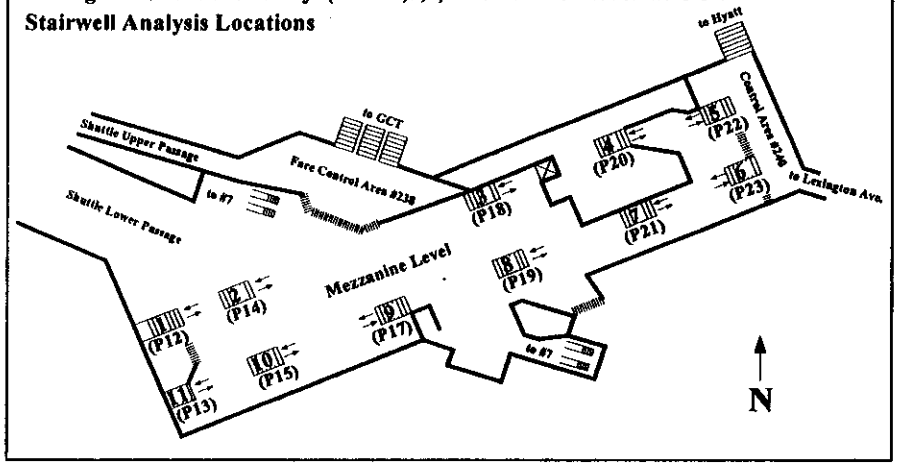


TABLE M-21

2010 MITIGATED BUILD SUBWAY STAIRS ANALYSES

Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	70	85	155	11.0	10.0	10	90	0.34	A	
1 (P12)	280	335	615	11.0	10.0	10	90	1.37	E	*
2 (P14)	170	535	705	11.0	10.0	20	80	1.76	F	*
3 (P18)	305	310	615	11.0	10.0	10	90	1.37	E	
4 (P20)	255	230	485	11.0	10.0	10	90	1.08	D	
5 (P22)	245	160	405	6.5	5.5	10	50	1.64	E	
6 (P23)	380	55	435	6.5	5.5	20	44	1.98	F	
7 (P21)	295	35	330	11.0	10.0	20	80	0.83	C	
8 (P19)	210	160	370	11.0	10.0	10	90	0.82	C	
9 (P17)	115	175	290	11.0	10.0	10	90	0.64	B	
10 (P15)	75	130	205	11.0	10.0	10	90	0.46	B	
11 (P13)	175	50	225	11.0	10.0	20	80	0.56	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

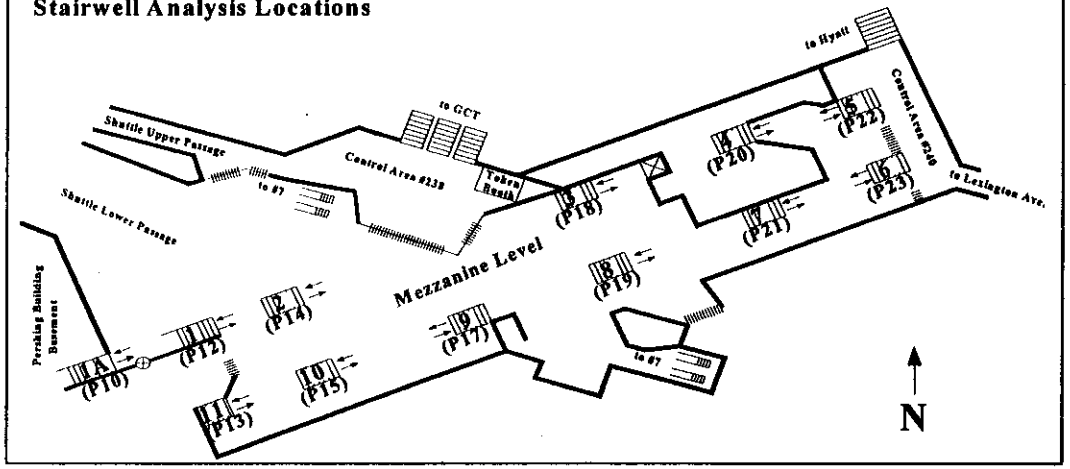


Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	200	245	445	11.0	10.0	10	90	0.33	A	
1 (P12)	685	930	1,615	11.0	10.0	10	90	1.20	D	*
2 (P14)	420	1,375	1,795	11.0	10.0	20	80	1.50	E	*
3 (P18)	700	740	1,440	11.0	10.0	10	90	1.07	D	*
4 (P20)	710	675	1,385	11.0	10.0	10	90	1.03	D	
5 (P22)	595	400	995	6.5	5.5	10	50	1.34	E	
6 (P23)	960	155	1,115	6.5	5.5	20	44	1.69	F	
7 (P21)	725	90	815	11.0	10.0	20	80	0.68	B	
8 (P19)	590	395	985	11.0	10.0	10	90	0.73	C	
9 (P17)	315	485	800	11.0	10.0	10	90	0.59	B	
10 (P15)	195	355	550	11.0	10.0	10	90	0.41	A	
11 (P13)	475	90	565	11.0	10.0	20	80	0.47	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

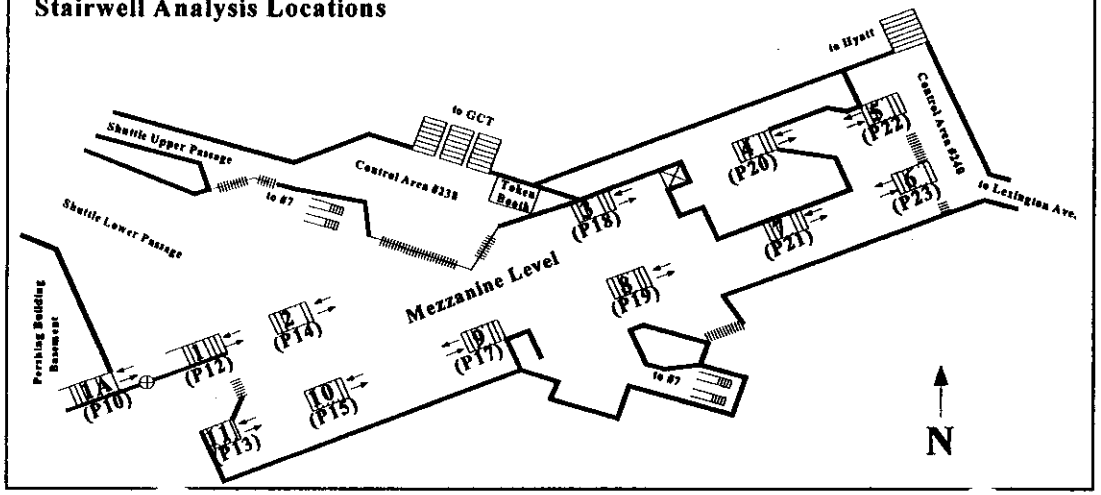


Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	45	30	75	11.0	10.0	10	90	0.17	A
1 (P12)	95	100	195	11.0	10.0	10	90	0.43	A
2 (P14)	70	320	390	11.0	10.0	20	80	0.98	C
3 (P18)	120	110	230	11.0	10.0	10	90	0.51	B
4 (P20)	60	170	230	11.0	10.0	20	80	0.58	B
5 (P22)	45	260	305	6.5	5.5	20	44	1.39	E
6 (P23)	245	220	465	6.5	5.5	10	50	1.88	F
7 (P21)	245	120	365	11.0	10.0	20	80	0.91	C
8 (P19)	155	135	290	11.0	10.0	10	90	0.64	B
9 (P17)	245	195	440	11.0	10.0	10	90	0.98	C
10 (P15)	195	175	370	11.0	10.0	10	90	0.82	C
11 (P13)	240	210	450	11.0	10.0	10	90	1.00	D

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

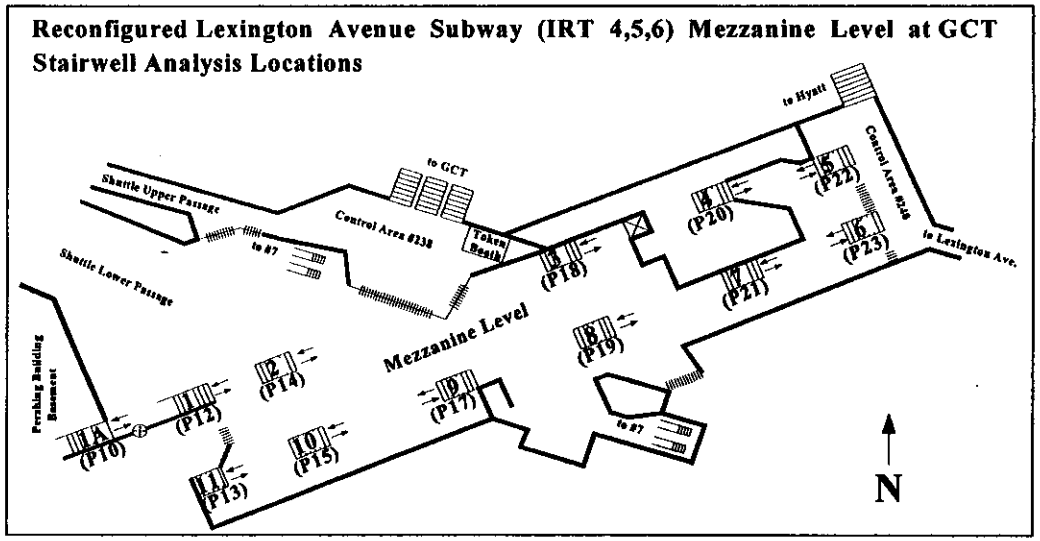


Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	125	100	225	11.0	10.0	10	90	0.17	A
1 (P12)	260	235	495	11.0	10.0	10	90	0.37	A
2 (P14)	195	880	1,075	11.0	10.0	20	80	0.90	C
3 (P18)	320	310	630	11.0	10.0	10	90	0.47	B
4 (P20)	150	440	590	11.0	10.0	20	80	0.49	B
5 (P22)	90	715	805	6.5	5.5	20	44	1.22	D
6 (P23)	610	365	975	6.5	5.5	10	50	1.31	D
7 (P21)	635	285	920	11.0	10.0	20	80	0.77	C
8 (P19)	380	380	760	11.0	10.0	10	90	0.56	B
9 (P17)	605	550	1,155	11.0	10.0	10	90	0.86	C
10 (P15)	480	480	960	11.0	10.0	10	90	0.71	C
11 (P13)	545	495	1,040	11.0	10.0	10	90	0.77	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

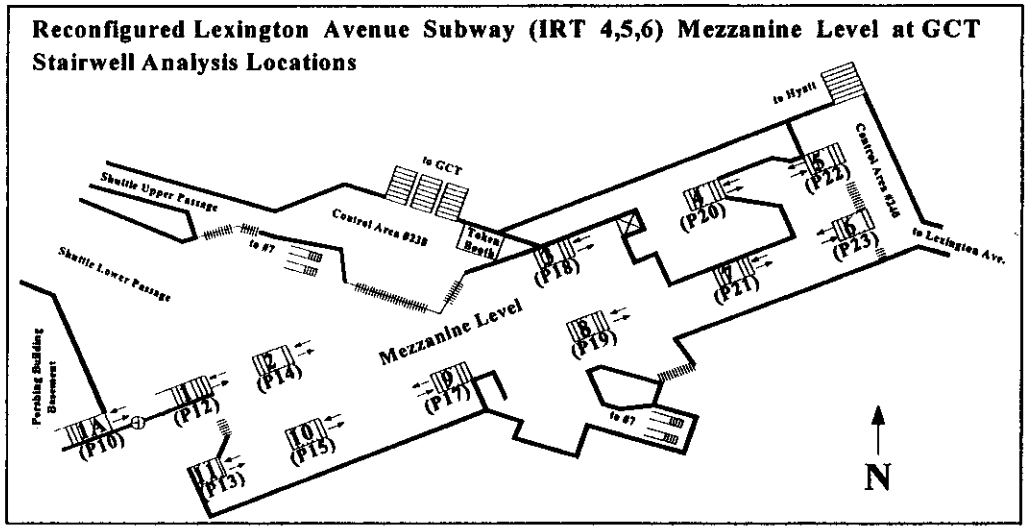


TABLE M-22

2020 MITIGATED BUILD SUBWAY STAIRS ANALYSES

Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	70	90	160	11.0	10.0	10	90	0.36	A	
1 (P12)	305	365	670	11.0	10.0	10	90	1.49	E	*
2 (P14)	175	585	760	11.0	10.0	20	80	1.90	F	*
3 (P18)	320	340	660	11.0	10.0	10	90	1.47	E	
4 (P20)	270	260	530	11.0	10.0	10	90	1.18	D	
5 (P22)	260	180	440	6.5	5.5	10	50	1.78	F	
6 (P23)	395	60	455	6.5	5.5	20	44	2.07	F	
7 (P21)	305	35	340	11.0	10.0	20	80	0.85	C	
8 (P19)	220	175	395	11.0	10.0	10	90	0.88	C	
9 (P17)	120	190	310	11.0	10.0	10	90	0.69	B	
10 (P15)	70	150	220	11.0	10.0	20	80	0.55	B	
11 (P13)	170	50	220	11.0	10.0	20	80	0.55	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

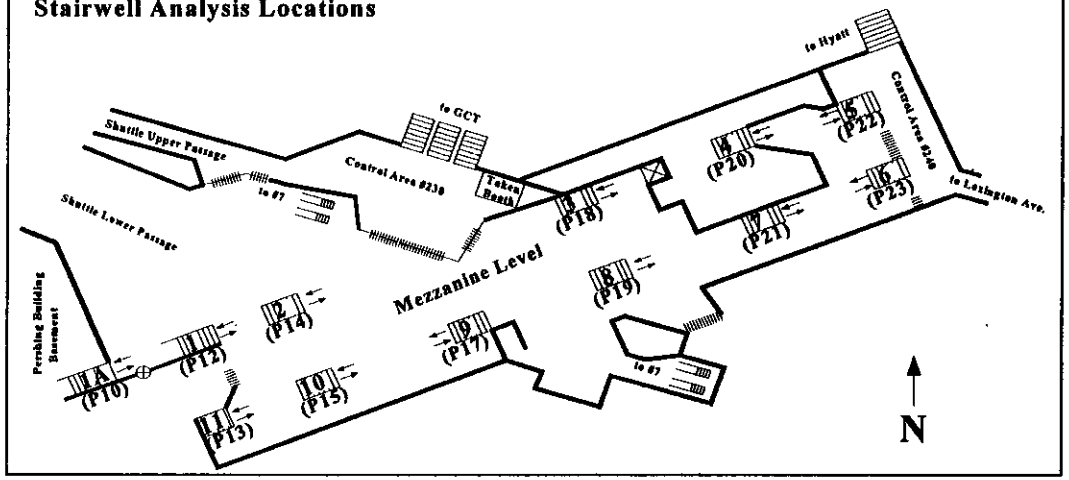


Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	205	260	465	11.0	10.0	10	90	0.34	A
1 (P12)	720	1,005	1,725	11.0	10.0	10	90	1.28	D
2 (P14)	440	1,515	1,955	11.0	10.0	20	80	1.63	E
3 (P18)	730	820	1,550	11.0	10.0	10	90	1.15	D
4 (P20)	740	745	1,485	11.0	10.0	10	90	1.10	D
5 (P22)	620	445	1,065	6.5	5.5	10	50	1.43	E
6 (P23)	1,005	170	1,175	6.5	5.5	20	44	1.78	F
7 (P21)	760	95	855	11.0	10.0	20	80	0.71	C
8 (P19)	625	430	1,055	11.0	10.0	10	90	0.78	C
9 (P17)	330	535	865	11.0	10.0	10	90	0.64	B
10 (P15)	200	390	590	11.0	10.0	10	90	0.44	A
11 (P13)	500	100	600	11.0	10.0	20	80	0.50	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

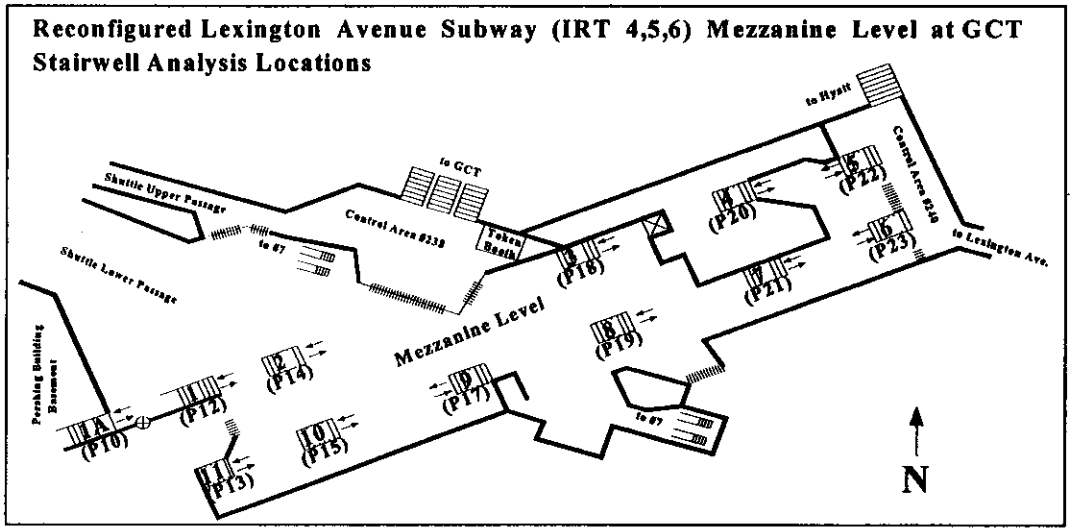


Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	45	35	80	11.0	10.0	10	90	0.18	A	
1 (P12)	110	100	210	11.0	10.0	10	90	0.47	B	
2 (P14)	75	330	405	11.0	10.0	20	80	1.01	D	
3 (P18)	135	115	250	11.0	10.0	10	90	0.56	B	
4 (P20)	65	180	245	11.0	10.0	20	80	0.61	B	
5 (P22)	45	270	315	6.5	5.5	20	44	1.43	E	
6 (P23)	270	230	500	6.5	5.5	10	50	2.04	F	
7 (P21)	275	125	400	11.0	10.0	20	80	1.00	D	
8 (P19)	175	145	320	11.0	10.0	10	90	0.71	C	
9 (P17)	260	200	460	11.0	10.0	10	90	1.02	D	*
10 (P15)	220	185	405	11.0	10.0	10	90	0.90	C	
11 (P13)	260	220	480	11.0	10.0	10	90	1.07	D	*

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

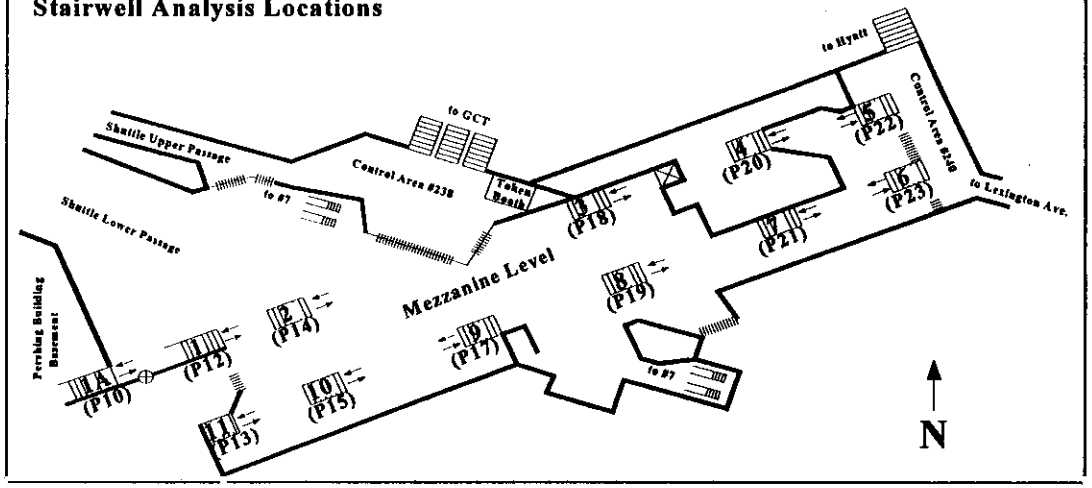


Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	135	105	240	11.0	10.0	10	90	0.18	A
1 (P12)	280	240	520	11.0	10.0	10	90	0.39	A
2 (P14)	215	920	1,135	11.0	10.0	20	80	0.95	C
3 (P18)	350	325	675	11.0	10.0	10	90	0.50	B
4 (P20)	165	465	630	11.0	10.0	20	80	0.53	B
5 (P22)	95	750	845	6.5	5.5	20	44	1.28	D
6 (P23)	675	385	1,060	6.5	5.5	10	50	1.43	E
7 (P21)	695	305	1,000	11.0	10.0	20	80	0.83	C
8 (P19)	410	400	810	11.0	10.0	10	90	0.60	B
9 (P17)	660	570	1,230	11.0	10.0	10	90	0.91	C
10 (P15)	515	500	1,015	11.0	10.0	10	90	0.75	C
11 (P13)	585	515	1,100	11.0	10.0	10	90	0.81	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

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Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

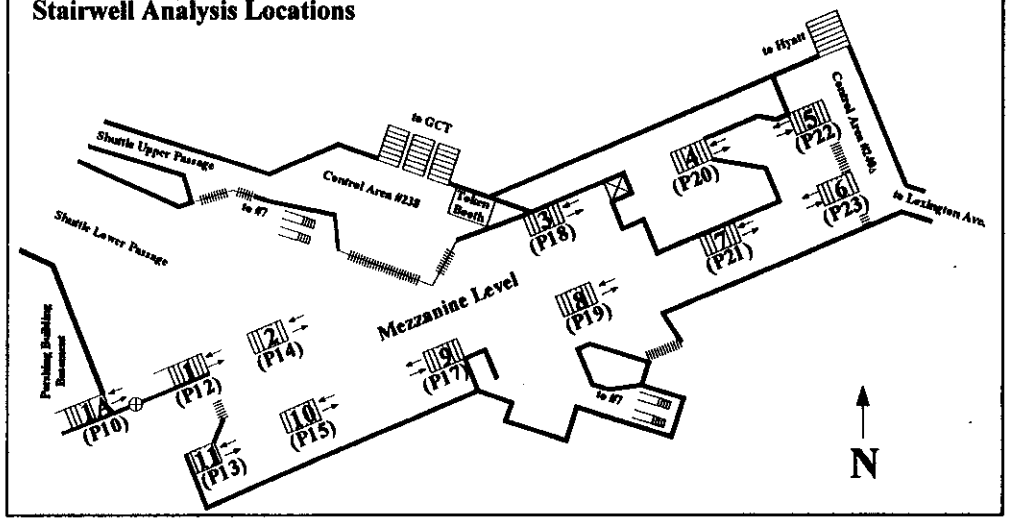


TABLE M-23

EXISTING
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	125	1	7	875	430	37	224	0.17	71.0	16	1,136	**2,011**	**36%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	50	26	224	0.12	5.8	16	93	**268**	**9%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	355	40	224	0.18	63.4	16	1,014	**1,364**	**32%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	325	1	7	2,275	600	49	224	0.22	131.3	16	2,100	**4,375**	**90%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**28%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	185	29	224	0.13	24.0	16	383	**908**	**33%**	**C/D or better**
Zone 8	2,165	5	**10,825**	75	1	7	525	220	48	224	0.21	47.1	16	754	**1,279**	**12%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	225	1	7	1,575	630	51	224	0.23	143.4	16	2,295	**3,870**	**40%**	**C/D or better**
Zone 2	570	5	**2,850**	100	1	7	700	625	27	224	0.12	75.3	16	1,205	**1,905**	**67%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	130	30	224	0.13	17.4	16	279	**629**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	175	1	7	1,225	615	49	224	0.22	134.5	16	2,153	**3,378**	**64%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	470	42	224	0.19	88.1	16	1,410	**2,110**	**52%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	70	33	224	0.15	10.3	16	165	**865**	**22%**	**C/D or better**
Zone 8	1,155	5	**5,775**	125	1	7	875	400	29	224	0.13	51.8	16	829	**1,704**	**29%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

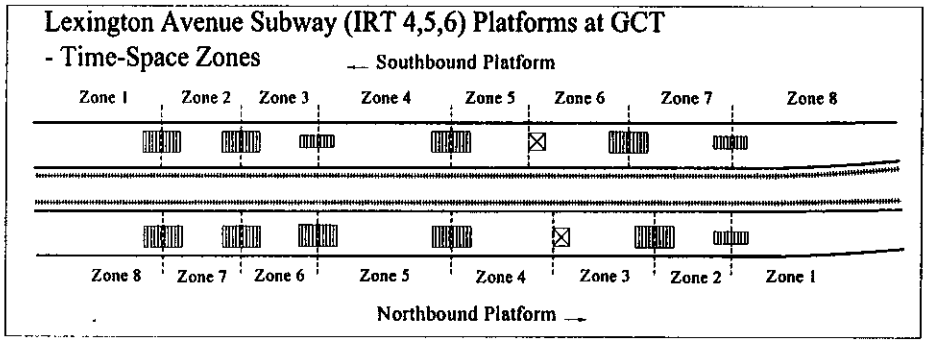


Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	375	1	7	2,625	1,115	37	224	0.17	184.2	16	2,947	**5,572**	**33%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	150	26	224	0.12	17.4	16	279	**804**	**9%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	910	40	224	0.18	162.5	16	2,600	**3,650**	**28%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	180	35	224	0.16	28.1	16	450	**3,075**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	975	1	7	6,825	1,695	49	224	0.22	370.8	16	5,933	**12,758**	**88%**	**C/D or better**
Zone 6	575	15	**8,625**	225	1	7	1,575	405	30	224	0.13	54.2	16	868	**2,443**	**28%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	490	29	224	0.13	63.4	16	1,015	**2,590**	**31%**	**C/D or better**
Zone 8	2,165	15	**32,475**	225	1	7	1,575	580	48	224	0.21	124.3	16	1,989	**3,564**	**11%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	675	1	7	4,725	1,705	51	224	0.23	388.2	16	6,211	**10,936**	**38%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,605	27	224	0.12	193.5	16	3,095	**5,195**	**61%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	390	30	224	0.13	52.2	16	836	**1,886**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	525	1	7	3,675	1,505	49	224	0.22	329.2	16	5,268	**8,943**	**57%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	195	21	224	0.09	18.3	16	293	**1,868**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,335	42	224	0.19	250.3	16	4,005	**6,105**	**50%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	210	33	224	0.15	30.9	16	495	**2,595**	**22%**	**C/D or better**
Zone 8	1,155	15	**17,325**	375	1	7	2,625	995	29	224	0.13	128.8	16	2,061	**4,686**	**27%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

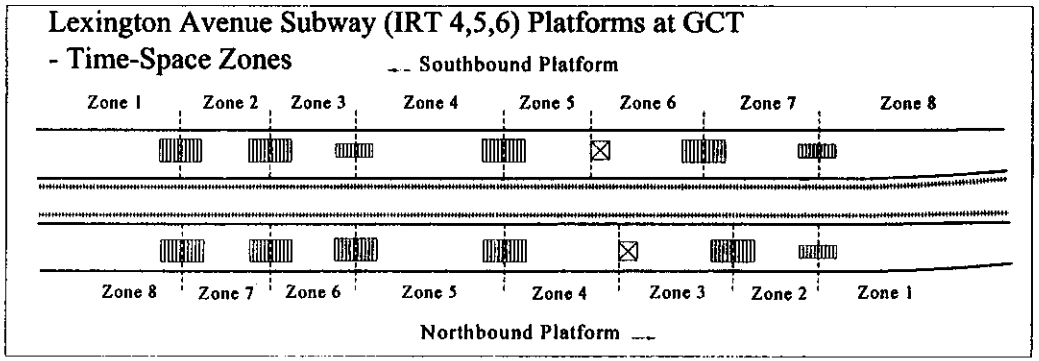


Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	200	1	7	1,400	355	37	224	0.17	58.6	16	938	**2,338**	**42%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	410	40	224	0.18	73.2	16	1,171	**2,046**	**47%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	115	35	224	0.16	18.0	16	288	**988**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	200	1	7	1,400	665	49	224	0.22	145.5	16	2,328	**3,728**	**77%**	**C/D or better**
Zone 6	575	5	**2,875**	100	1	7	700	125	30	224	0.13	16.7	16	268	**968**	**34%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	370	29	224	0.13	47.9	16	766	**1,466**	**53%**	**C/D or better**
Zone 8	2,165	5	**10,825**	400	1	7	2,800	400	48	224	0.21	85.7	16	1,371	**4,171**	**39%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	275	1	7	1,925	280	51	224	0.23	63.8	16	1,020	**2,945**	**31%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	430	27	224	0.12	51.8	16	829	**1,704**	**60%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	120	30	224	0.13	16.1	16	257	**782**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	295	49	224	0.22	64.5	16	1,033	**1,733**	**33%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	100	21	224	0.09	9.4	16	150	**500**	**30%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	270	42	224	0.19	50.6	16	810	**1,510**	**37%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	305	29	224	0.13	39.5	16	632	**2,032**	**35%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

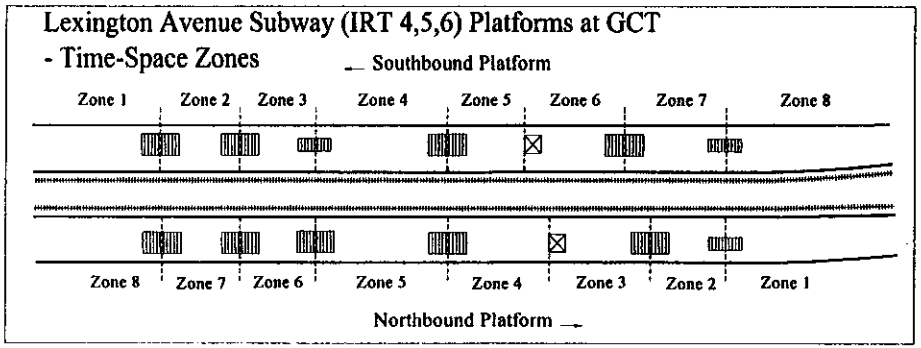


Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	600	1	7	4,200	975	37	224	0.17	161.0	16	2,577	**6,777**	**41%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	165	26	224	0.12	19.2	16	306	**1,356**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,070	40	224	0.18	191.1	16	3,057	**5,682**	**44%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	345	35	224	0.16	53.9	16	863	**2,963**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	600	1	7	4,200	1,755	49	224	0.22	383.9	16	6,143	**10,343**	**71%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	375	30	224	0.13	50.2	16	804	**2,904**	**34%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	955	29	224	0.13	123.6	16	1,978	**4,078**	**49%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,200	1	7	8,400	925	48	224	0.21	198.2	16	3,171	**11,571**	**36%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	825	1	7	5,775	750	51	224	0.23	170.8	16	2,732	**8,507**	**30%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,215	27	224	0.12	146.5	16	2,343	**4,968**	**58%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	360	30	224	0.13	48.2	16	771	**2,346**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	815	49	224	0.22	178.3	16	2,853	**4,953**	**31%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	300	21	224	0.09	28.1	16	450	**1,500**	**30%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	705	42	224	0.19	132.2	16	2,115	**4,215**	**35%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	195	33	224	0.15	28.7	16	460	**3,085**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	600	1	7	4,200	825	29	224	0.13	106.8	16	1,709	**5,909**	**34%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

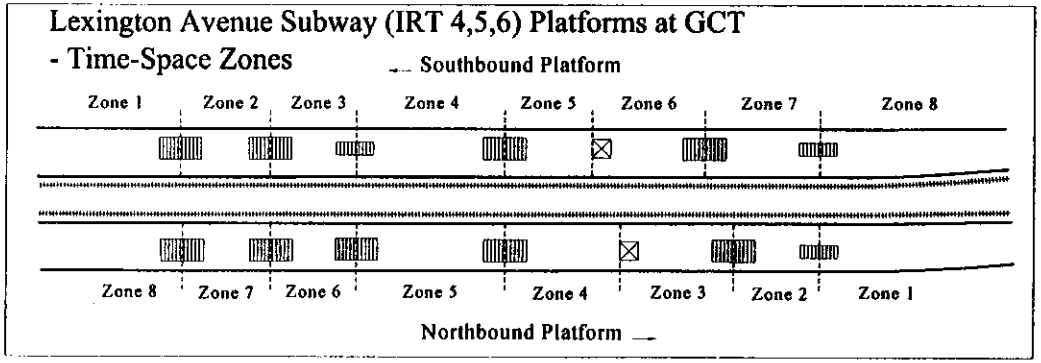


TABLE M-24

2010 NO BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	125	1	7	875	455	37	224	0.17	75.2	16	1,203	**2,078**	**37%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	375	40	224	0.18	67.0	16	1,071	**1,421**	**33%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	350	1	7	2,450	645	49	224	0.22	141.1	16	2,258	**4,708**	**97%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	200	29	224	0.13	25.9	16	414	**939**	**34%**	**C/D or better**
Zone 8	2,165	5	**10,825**	75	1	7	525	235	48	224	0.21	50.4	16	806	**1,331**	**12%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	225	1	7	1,575	675	51	224	0.23	153.7	16	2,459	**4,034**	**42%**	**C/D or better**
Zone 2	570	5	**2,850**	100	1	7	700	690	27	224	0.12	83.2	16	1,331	**2,031**	**71%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	140	30	224	0.13	18.8	16	300	**650**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	175	1	7	1,225	670	49	224	0.22	146.6	16	2,345	**3,570**	**68%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	505	42	224	0.19	94.7	16	1,515	**2,215**	**55%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	125	1	7	875	425	29	224	0.13	55.0	16	880	**1,755**	**30%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

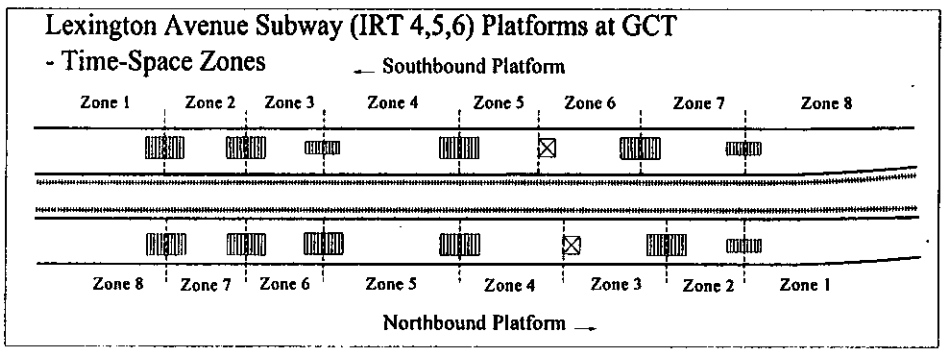


Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	375	1	7	2,625	1,180	37	224	0.17	194.9	16	3,119	**5,744**	**34%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	160	26	224	0.12	18.6	16	297	**822**	**9%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	965	40	224	0.18	172.3	16	2,757	**3,807**	**29%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,050	1	7	7,350	1,825	49	224	0.22	399.2	16	6,388	**13,738**	**94%**	**C/D - Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	530	29	224	0.13	68.6	16	1,098	**2,673**	**32%**	**C/D or better**
Zone 8	2,165	15	**32,475**	225	1	7	1,575	610	48	224	0.21	130.7	16	2,091	**3,666**	**11%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	675	1	7	4,725	1,845	51	224	0.23	420.1	16	6,721	**11,446**	**40%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,765	27	224	0.12	212.7	16	3,404	**5,504**	**64%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	425	30	224	0.13	56.9	16	911	**1,961**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	525	1	7	3,675	1,635	49	224	0.22	357.7	16	5,723	**9,398**	**60%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,450	42	224	0.19	271.9	16	4,350	**6,450**	**53%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	230	33	224	0.15	33.9	16	542	**2,642**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	375	1	7	2,625	1,075	29	224	0.13	139.2	16	2,227	**4,852**	**28%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

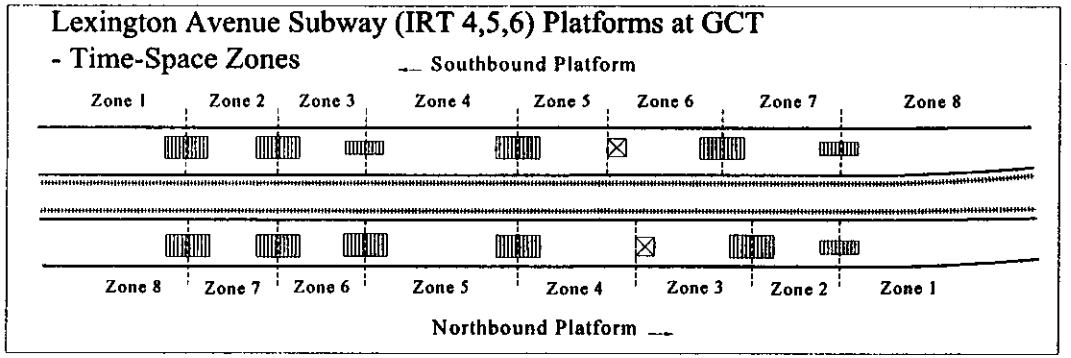


Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	200	1	7	1,400	490	37	224	0.17	80.9	16	1,295	**2,695**	**48%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	445	40	224	0.18	79.5	16	1,271	**2,146**	**50%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	200	1	7	1,400	725	49	224	0.22	158.6	16	2,538	**3,938**	**81%**	**C/D or better**
Zone 6	575	5	**2,875**	100	1	7	700	135	30	224	0.13	18.1	16	289	**989**	**34%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	390	29	224	0.13	50.5	16	808	**1,508**	**55%**	**C/D or better**
Zone 8	2,165	5	**10,825**	425	1	7	2,975	430	48	224	0.21	92.1	16	1,474	**4,449**	**41%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	300	1	7	2,100	300	51	224	0.23	68.3	16	1,093	**3,193**	**33%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	460	27	224	0.12	55.4	16	887	**1,762**	**62%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	315	49	224	0.22	68.9	16	1,103	**1,803**	**34%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	280	42	224	0.19	52.5	16	840	**1,540**	**38%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	325	29	224	0.13	42.1	16	673	**2,073**	**36%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

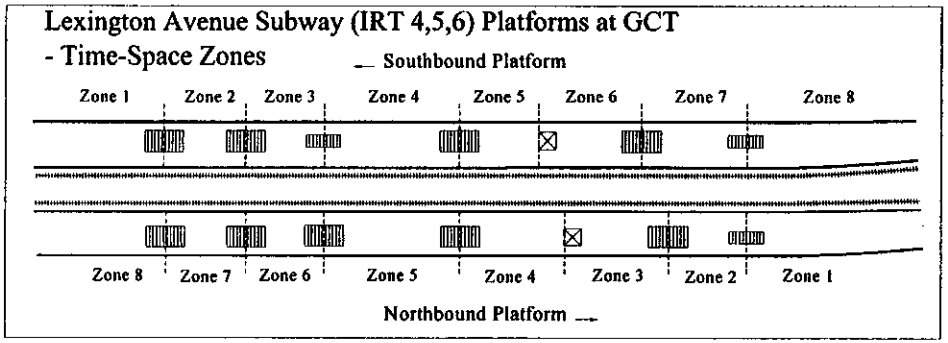


Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	600	1	7	4,200	1,065	37	224	0.17	175.9	16	2,815	**7,015**	**42%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	175	26	224	0.12	20.3	16	325	**1,375**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,165	40	224	0.18	208.0	16	3,329	**5,954**	**46%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	600	1	7	4,200	1,895	49	224	0.22	414.5	16	6,633	**10,833**	**74%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	400	30	224	0.13	53.6	16	857	**2,957**	**34%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	1,030	29	224	0.13	133.3	16	2,134	**4,234**	**51%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,275	1	7	8,925	1,000	48	224	0.21	214.3	16	3,429	**12,354**	**38%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	900	1	7	6,300	800	51	224	0.23	182.1	16	2,914	**9,214**	**32%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,315	27	224	0.12	158.5	16	2,536	**5,161**	**60%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	870	49	224	0.22	190.3	16	3,045	**5,145**	**33%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	750	42	224	0.19	140.6	16	2,250	**4,350**	**36%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	195	33	224	0.15	28.7	16	460	**3,085**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	600	1	7	4,200	875	29	224	0.13	113.3	16	1,813	**6,013**	**35%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

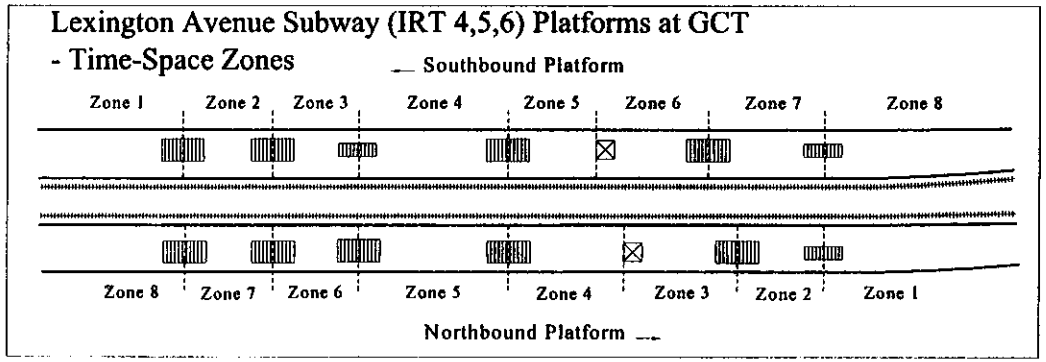


TABLE M-25

2020 NO BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	475	37	224	0.17	78.5	16	1,255	**2,305**	**41%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	395	40	224	0.18	70.5	16	1,129	**1,479**	**34%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	70	35	224	0.16	10.9	16	175	**1,225**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	210	29	224	0.13	27.2	16	435	**1,135**	**41%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	275	1	7	1,925	725	51	224	0.23	165.1	16	2,641	**4,566**	**48%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	745	27	224	0.12	89.8	16	1,437	**2,312**	**81%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	155	30	224	0.13	20.8	16	332	**682**	**22%**	**C/D or better**
Zone 4	1,050	5	**5,250**	225	1	7	1,575	720	49	224	0.22	157.5	16	2,520	**4,095**	**78%**	**C/D or better**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	125	1	7	875	545	42	224	0.19	102.2	16	1,635	**2,510**	**62%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	460	29	224	0.13	59.6	16	953	**2,003**	**35%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

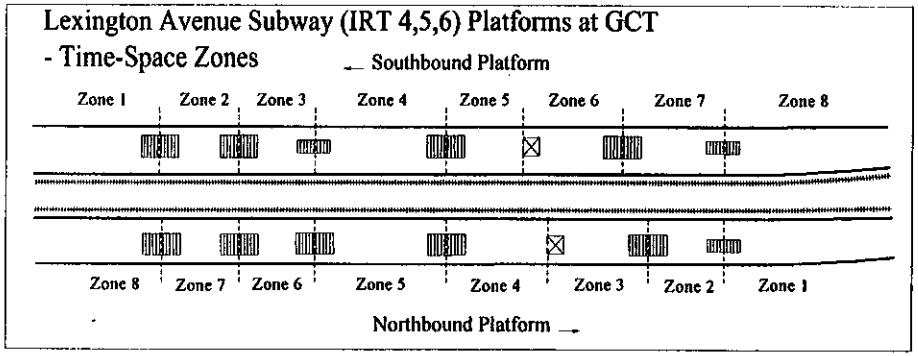


Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	450	1	7	3,150	1,245	37	224	0.17	205.6	16	3,290	**6,440**	**39%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	175	26	224	0.12	20.3	16	325	**850**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	1,015	40	224	0.18	181.3	16	2,900	**3,950**	**30%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,965	49	211	0.23	456.3	13.5	6,160	**12,160**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	580	29	224	0.13	75.1	16	1,201	**3,301**	**40%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	650	48	224	0.21	139.3	16	2,229	**4,329**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	825	1	7	5,775	1,980	51	224	0.23	450.8	16	7,213	**12,988**	**45%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,900	27	224	0.12	229.0	16	3,664	**6,289**	**74%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	465	30	224	0.13	62.3	16	996	**2,046**	**22%**	**C/D or better**
Zone 4	1,050	15	**15,750**	675	1	7	4,725	1,760	49	224	0.22	385.0	16	6,160	**10,885**	**69%**	**C/D or better**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	375	1	7	2,625	1,550	42	224	0.19	290.6	16	4,650	**7,275**	**60%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	245	33	224	0.15	36.1	16	578	**3,203**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	450	1	7	3,150	1,145	29	224	0.13	148.2	16	2,372	**5,522**	**32%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

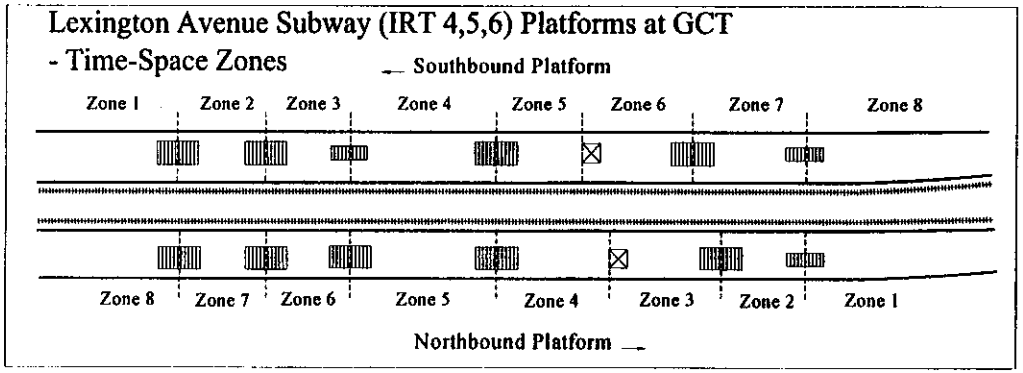


Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	225	1	7	1,575	530	37	224	0.17	87.5	16	1,401	**2,976**	**53%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	60	26	224	0.12	7.0	16	111	**461**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	485	40	224	0.18	86.6	16	1,386	**2,261**	**52%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	130	35	224	0.16	20.3	16	325	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	225	1	7	1,575	770	49	224	0.22	168.4	16	2,695	**4,270**	**88%**	**C/D or better**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	425	29	224	0.13	55.0	16	880	**1,580**	**57%**	**C/D or better**
Zone 8	2,165	5	**10,825**	450	1	7	3,150	460	48	224	0.21	98.6	16	1,577	**4,727**	**44%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	300	1	7	2,100	315	51	224	0.23	71.7	16	1,148	**3,248**	**34%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	475	27	224	0.12	57.3	16	916	**1,791**	**63%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**27%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	340	49	224	0.22	74.4	16	1,190	**1,890**	**36%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	115	21	224	0.09	10.8	16	173	**523**	**32%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	300	42	224	0.19	56.3	16	900	**1,600**	**40%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	70	33	224	0.15	10.3	16	165	**1,040**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	225	1	7	1,575	335	29	224	0.13	43.4	16	694	**2,269**	**39%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

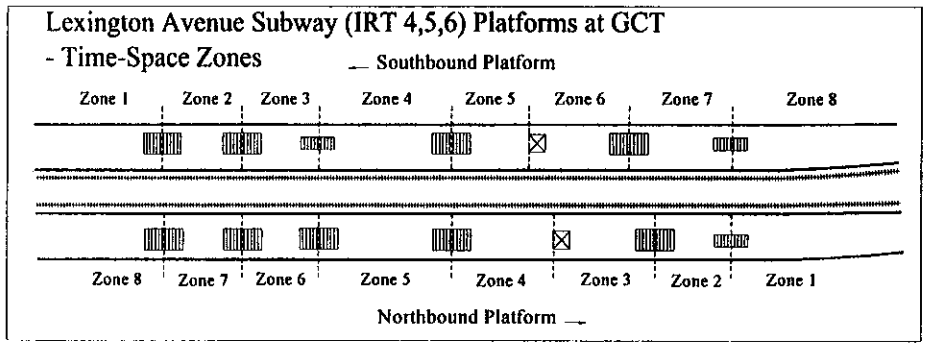


Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sq ft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	675	1	7	4,725	1,150	37	224	0.17	190.0	16	3,039	**7,764**	**46%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,255	40	224	0.18	224.1	16	3,586	**6,211**	**48%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	675	1	7	4,725	2,020	49	224	0.22	441.9	16	7,070	**11,795**	**81%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	1,090	29	224	0.13	141.1	16	2,258	**4,358**	**53%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,350	1	7	9,450	1,065	48	224	0.21	228.2	16	3,651	**13,101**	**40%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	900	1	7	6,300	845	51	224	0.23	192.4	16	3,078	**9,378**	**33%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,360	27	224	0.12	163.9	16	2,623	**5,248**	**61%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	935	49	224	0.22	204.5	16	3,273	**5,373**	**34%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	795	42	224	0.19	149.1	16	2,385	**4,485**	**37%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	915	29	224	0.13	118.5	16	1,895	**6,620**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

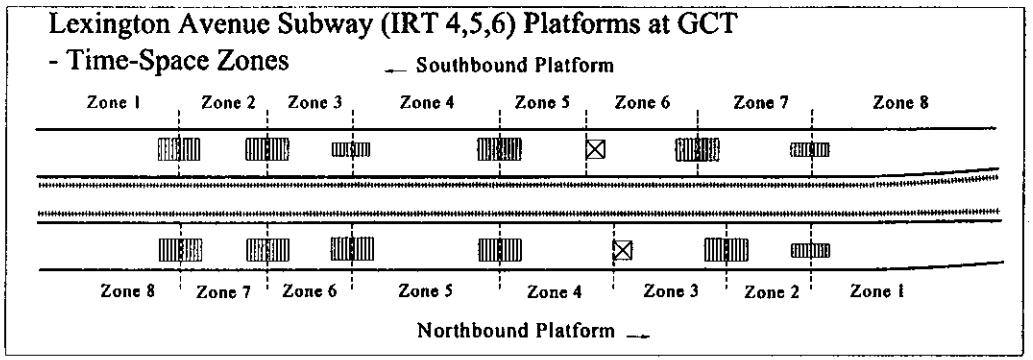


TABLE M-26

2010 BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	125	1	7	875	460	37	224	0.17	76.0	16	1,216	**2,091**	**38%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	380	40	224	0.18	67.9	16	1,086	**1,436**	**33%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	220	29	224	0.13	28.5	16	456	**981**	**36%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	275	1	7	1,925	730	51	224	0.23	166.2	16	2,659	**4,584**	**48%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	790	27	224	0.12	95.2	16	1,524	**2,399**	**84%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	140	30	224	0.13	18.8	16	300	**650**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	225	1	7	1,575	735	49	224	0.22	160.8	16	2,573	**4,148**	**79%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	515	42	224	0.19	96.6	16	1,545	**2,245**	**55%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	125	1	7	875	435	29	224	0.13	56.3	16	901	**1,776**	**31%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

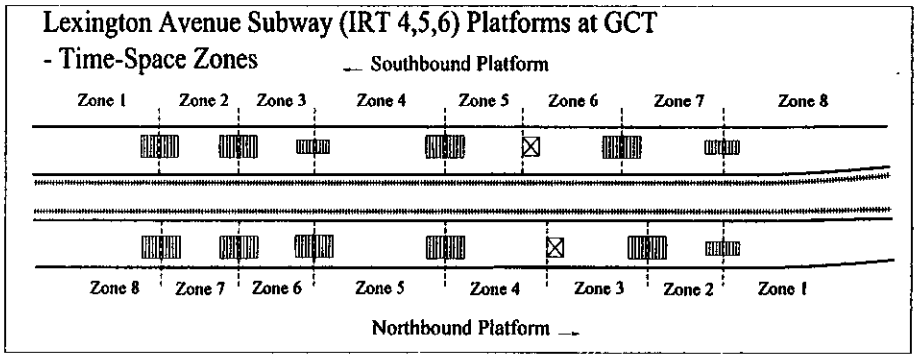


Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	375	1	7	2,625	1,195	37	224	0.17	197.4	16	3,158	**5,783**	**35%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	165	26	224	0.12	19.2	16	306	**831**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	975	40	224	0.18	174.1	16	2,786	**3,836**	**30%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,975	49	211	0.23	458.6	13.5	6,192	**12,192**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	590	29	224	0.13	76.4	16	1,222	**2,797**	**34%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	630	48	224	0.21	135.0	16	2,160	**4,260**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	825	1	7	5,775	2,035	51	224	0.23	463.3	16	7,413	**13,188**	**46%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	2,040	27	224	0.12	245.9	16	3,934	**6,559**	**77%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	425	30	224	0.13	56.9	16	911	**1,961**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	675	1	7	4,725	1,815	49	224	0.22	397.0	16	6,353	**11,078**	**70%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,485	42	224	0.19	278.4	16	4,455	**6,555**	**54%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	240	33	224	0.15	35.4	16	566	**2,666**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	375	1	7	2,625	1,095	29	224	0.13	141.8	16	2,268	**4,893**	**28%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

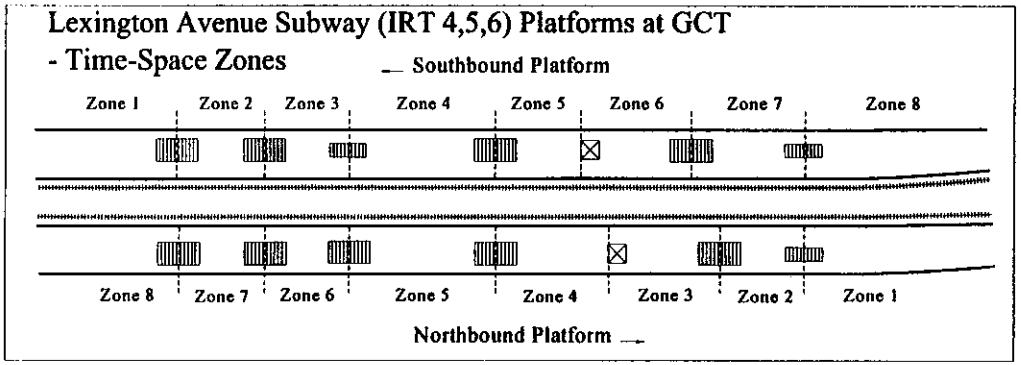


Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	200	1	7	1,400	530	37	224	0.17	87.5	16	1,401	**2,801**	**50%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	455	40	224	0.18	81.3	16	1,300	**2,175**	**50%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	250	1	7	1,750	815	49	224	0.22	178.3	16	2,853	**4,603**	**95%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	440	29	224	0.13	57.0	16	911	**1,786**	**65%**	**C/D or better**
Zone 8	2,165	5	**10,825**	550	1	7	3,850	485	48	224	0.21	103.9	16	1,663	**5,513**	**51%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	350	1	7	2,450	330	51	224	0.23	75.1	16	1,202	**3,652**	**38%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	485	27	224	0.12	58.5	16	935	**1,985**	**70%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	125	1	7	875	355	49	224	0.22	77.7	16	1,243	**2,118**	**40%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	285	42	224	0.19	53.4	16	855	**1,555**	**38%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	325	29	224	0.13	42.1	16	673	**2,073**	**36%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

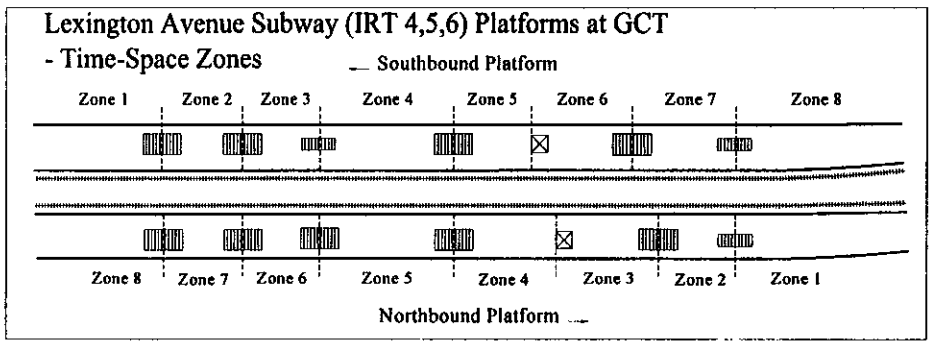


Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (pqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	600	1	7	4,200	1,095	37	224	0.17	180.9	16	2,894	**7,094**	**42%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,195	40	224	0.18	213.4	16	3,414	**6,039**	**47%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	750	1	7	5,250	2,190	49	224	0.22	479.1	16	7,665	**12,915**	**89%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	410	30	224	0.13	54.9	16	879	**2,979**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,195	29	224	0.13	154.7	16	2,475	**5,100**	**62%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,650	1	7	11,550	1,155	48	224	0.21	247.5	16	3,960	**15,510**	**48%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	1,050	1	7	7,350	875	51	224	0.23	199.2	16	3,188	**10,538**	**37%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,365	27	224	0.12	164.5	16	2,633	**5,783**	**68%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	375	1	7	2,625	985	49	224	0.22	215.5	16	3,448	**6,073**	**39%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	770	42	224	0.19	144.4	16	2,310	**4,410**	**36%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	600	1	7	4,200	880	29	224	0.13	113.9	16	1,823	**6,023**	**35%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

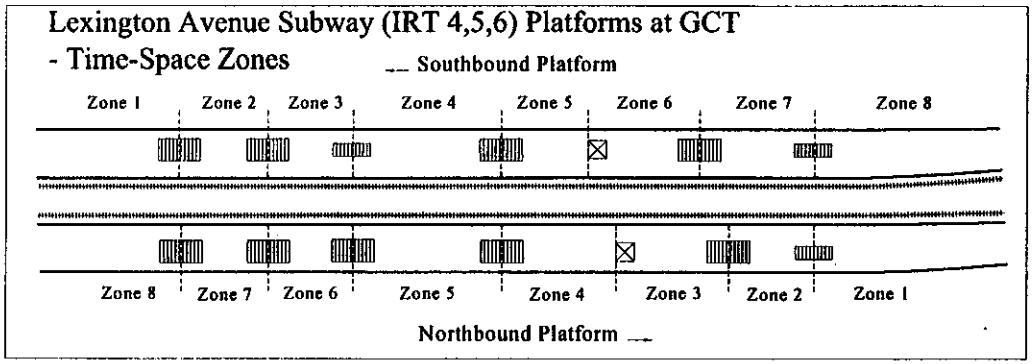


TABLE M-27

2020 BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	480	37	224	0.17	79.3	16	1,269	**2,319**	**42%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	400	40	224	0.18	71.4	16	1,143	**1,493**	**35%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	65	35	224	0.16	10.2	16	163	**1,213**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	450	1	5	2,250	745	49	211	0.23	173.0	13.5	2,336	**4,586**	**95%**	**Mid-D - D/E**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	230	29	224	0.13	29.8	16	476	**1,176**	**43%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	235	48	224	0.21	50.4	16	806	**1,506**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	325	1	7	2,275	790	51	224	0.23	179.9	16	2,878	**5,153**	**54%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	840	27	224	0.12	101.3	16	1,620	**2,670**	**94%**	**C/D - Mid-D**
Zone 3	610	5	**3,050**	50	1	7	350	155	30	224	0.13	20.8	16	332	**682**	**22%**	**C/D or better**
Zone 4	1,050	5	**5,250**	275	1	7	1,925	785	49	224	0.22	171.7	16	2,748	**4,673**	**89%**	**C/D or better**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	125	1	7	875	555	42	224	0.19	104.1	16	1,665	**2,540**	**63%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	470	29	224	0.13	60.8	16	974	**2,024**	**35%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

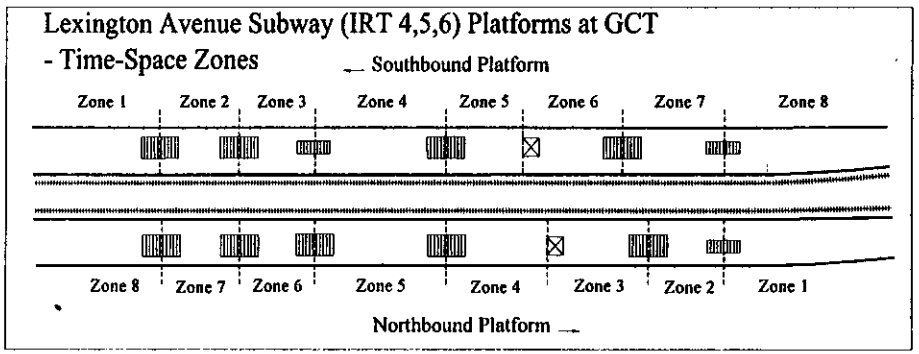


Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	450	1	7	3,150	1,260	37	224	0.17	208.1	16	3,330	**6,480**	**39%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	180	26	224	0.12	20.9	16	334	**859**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	1,030	40	224	0.18	183.9	16	2,943	**3,993**	**31%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,350	1	5	6,750	2,125	49	211	0.23	493.5	13.5	6,662	**13,412**	**92%**	**Mid-D - D/E**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	645	29	224	0.13	83.5	16	1,336	**3,436**	**42%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	670	48	224	0.21	143.6	16	2,297	**4,397**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	975	1	7	6,825	2,070	51	224	0.23	471.3	16	7,541	**14,366**	**50%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	2,215	27	224	0.12	267.0	16	4,272	**7,422**	**87%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	465	30	224	0.13	62.3	16	996	**2,046**	**22%**	**C/D or better**
Zone 4	1,050	15	**15,750**	825	1	7	5,775	1,950	49	224	0.22	426.6	16	6,825	**12,600**	**80%**	**C/D or better**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	375	1	7	2,625	1,585	42	224	0.19	297.2	16	4,755	**7,380**	**61%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	255	33	224	0.15	37.6	16	601	**3,226**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	450	1	7	3,150	1,165	29	224	0.13	150.8	16	2,413	**5,563**	**32%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

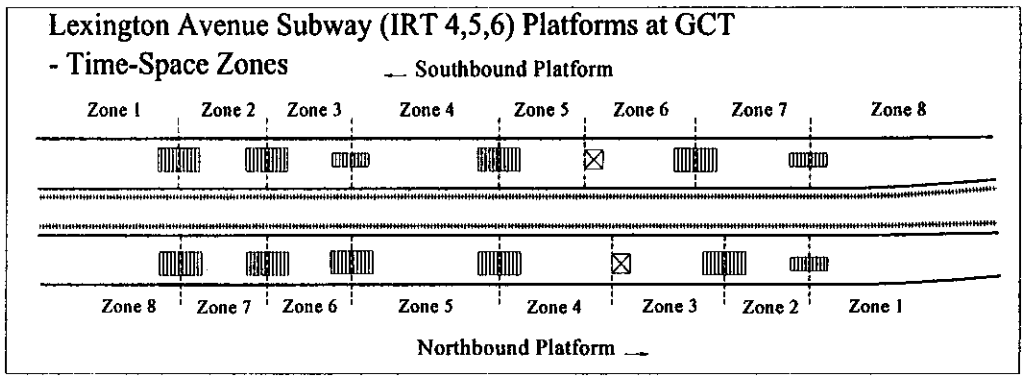


Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	5,575	225	1	7	1,575	535	37	224	0.17	88.4	16	1,414	2,989	54%	C/D or better
Zone 2	580	5	2,899	50	1	7	350	60	26	224	0.12	7.0	16	111	461	16%	C/D or better
Zone 3	865	5	4,325	125	1	7	875	490	40	224	0.18	87.5	16	1,400	2,275	53%	C/D or better
Zone 4	835	5	4,175	100	1	7	700	130	35	224	0.16	20.3	16	325	1,025	25%	C/D or better
Zone 5	970	5	4,850	300	1	5	1,500	865	49	211	0.23	200.9	13.5	2,712	4,212	87%	Mid-D *
Zone 6	575	5	2,875	100	1	7	700	140	30	224	0.13	18.8	16	300	1,000	35%	C/D or better
Zone 7	550	5	2,750	125	1	7	875	480	29	224	0.13	62.1	16	994	1,869	68%	C/D or better
Zone 8	2,165	5	10,825	575	1	7	4,025	515	48	224	0.21	110.4	16	1,766	5,791	53%	C/D or better
Southbound IRT Platform																	
Zone 1	1,920	5	9,600	350	1	7	2,450	345	51	224	0.23	78.5	16	1,257	3,707	39%	C/D or better
Zone 2	570	5	2,850	150	1	7	1,050	500	27	224	0.12	60.3	16	964	2,014	71%	C/D or better
Zone 3	610	5	3,050	75	1	7	525	135	30	224	0.13	18.1	16	289	814	27%	C/D or better
Zone 4	1,050	5	5,250	125	1	7	875	380	49	224	0.22	83.1	16	1,330	2,205	42%	C/D or better
Zone 5	330	5	1,650	50	1	7	350	115	21	224	0.09	10.8	16	173	523	32%	C/D or better
Zone 6	810	5	4,050	100	1	7	700	305	42	224	0.19	57.2	16	915	1,615	40%	C/D or better
Zone 7	770	5	3,850	125	1	7	875	70	33	224	0.15	10.3	16	165	1,040	27%	C/D or better
Zone 8	1,155	5	5,775	225	1	7	1,575	340	29	224	0.13	44.0	16	704	2,279	39%	C/D or better

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

" * " Signifigant Impacts

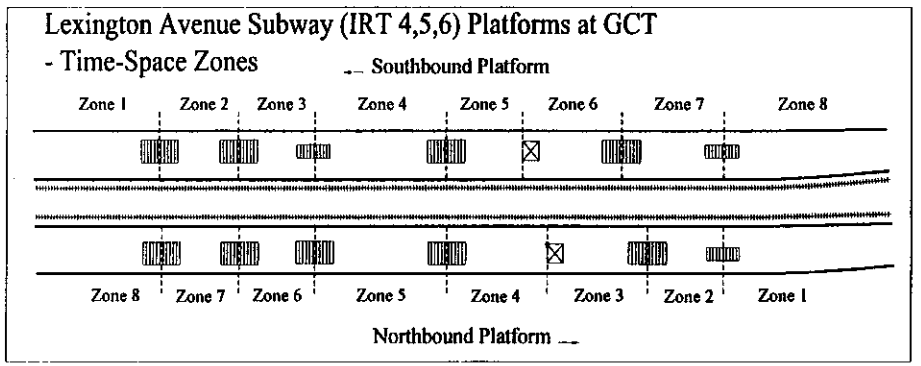


Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	675	1	7	4,725	1,170	37	224	0.17	193.3	16	3,092	**7,817**	**47%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	185	26	224	0.12	21.5	16	344	**1,394**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,290	40	224	0.18	230.4	16	3,686	**6,311**	**49%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	900	1	5	4,500	2,325	49	211	0.23	539.9	13.5	7,289	**11,789**	**81%**	**Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,260	29	224	0.13	163.1	16	2,610	**5,235**	**63%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,725	1	7	12,075	1,225	48	224	0.21	262.5	16	4,200	**16,275**	**50%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	1,050	1	7	7,350	930	51	224	0.23	211.7	16	3,388	**10,738**	**37%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,450	27	224	0.12	174.8	16	2,796	**5,946**	**70%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	375	1	7	2,625	1,060	49	224	0.22	231.9	16	3,710	**6,335**	**40%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	815	42	224	0.19	152.8	16	2,445	**4,545**	**37%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	215	33	224	0.15	31.7	16	507	**3,132**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	920	29	224	0.13	119.1	16	1,906	**6,631**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

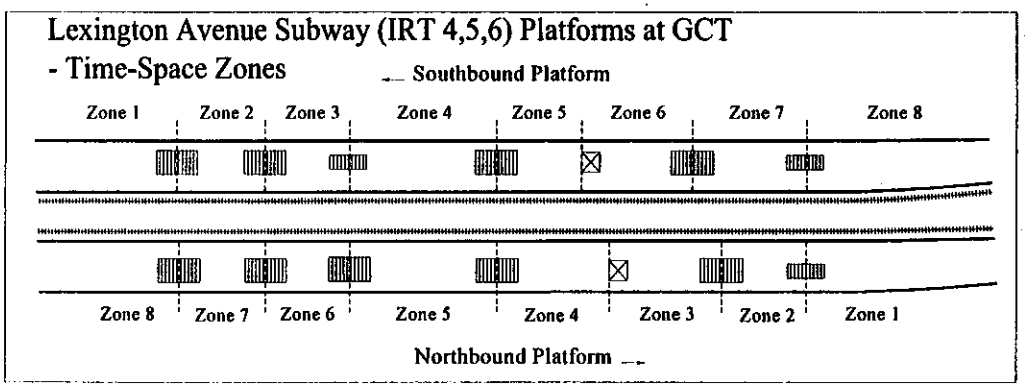


TABLE M-28

2010 MITIGATED BUILD SUBWAY PLATFORM TIME-SPACE ANALYSES

Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	515	37	224	0.17	85.1	16	1,361	**2,411**	**43%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	310	40	224	0.18	55.4	16	886	**1,236**	**29%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	220	29	224	0.13	28.5	16	456	**981**	**36%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	325	1	7	2,275	870	51	224	0.23	198.1	16	3,169	**5,444**	**39%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	715	27	224	0.12	86.2	16	1,379	**2,254**	**79%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	140	30	224	0.13	18.8	16	300	**650**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	200	1	7	1,400	680	49	224	0.22	148.8	16	2,380	**3,780**	**72%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	75	1	7	525	430	42	224	0.19	80.6	16	1,290	**1,815**	**45%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	505	29	224	0.13	65.4	16	1,046	**2,096**	**36%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

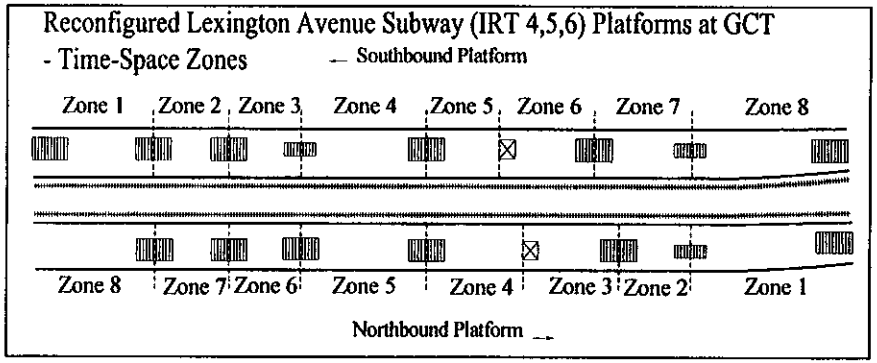


Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	225	1	7	1,575	1,310	37	224	0.17	216.4	16	3,462	**5,037**	**30%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	165	26	224	0.12	19.2	16	306	**831**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	825	40	224	0.18	147.3	16	2,357	**3,407**	**26%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,975	49	211	0.23	458.6	13.5	6,192	**12,192**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	590	29	224	0.13	76.4	16	1,222	**2,797**	**34%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	630	48	224	0.21	135.0	16	2,160	**4,260**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	975	1	7	6,825	2,470	51	224	0.23	562.4	16	8,998	**15,823**	**37%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,825	27	224	0.12	220.0	16	3,520	**5,620**	**66%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	425	30	224	0.13	56.9	16	911	**1,961**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	600	1	7	4,200	1,665	49	224	0.22	364.2	16	5,828	**10,028**	**64%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	225	1	7	1,575	1,200	42	224	0.19	225.0	16	3,600	**5,175**	**43%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	240	33	224	0.15	35.4	16	566	**2,666**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	300	1	7	2,100	1,325	29	224	0.13	171.5	16	2,745	**4,845**	**28%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

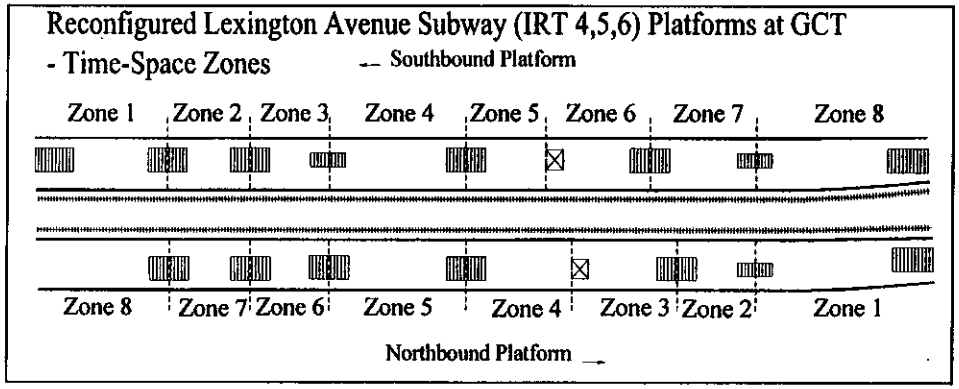


Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	225	1	7	1,575	560	37	224	0.17	92.5	16	1,480	**3,055**	**55%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	100	1	7	700	365	40	224	0.18	65.2	16	1,043	**1,743**	**40%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	250	1	7	1,750	815	49	224	0.22	178.3	16	2,853	**4,603**	**95%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	440	29	224	0.13	57.0	16	911	**1,786**	**65%**	**C/D or better**
Zone 8	2,165	5	**10,825**	550	1	7	3,850	485	48	224	0.21	103.9	16	1,663	**5,513**	**51%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	450	1	7	3,150	410	51	224	0.23	93.3	16	1,494	**4,644**	**33%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	460	27	224	0.12	55.4	16	887	**1,937**	**68%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	320	49	224	0.22	70.0	16	1,120	**1,820**	**35%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	250	42	224	0.19	46.9	16	750	**1,450**	**36%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	340	29	224	0.13	44.0	16	704	**2,104**	**36%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

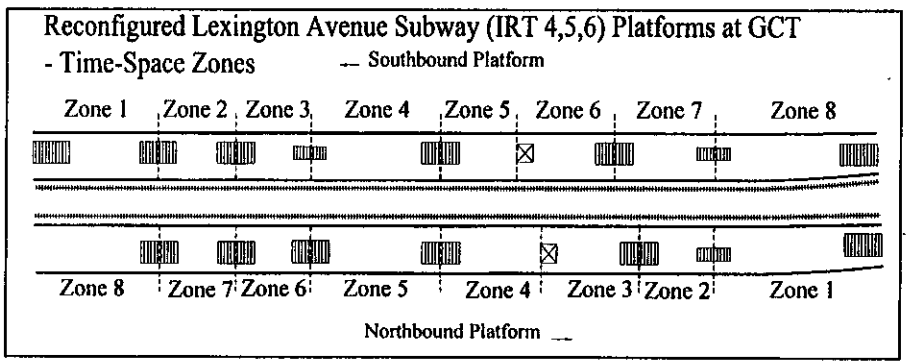


Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	750	1	7	5,250	1,270	37	224	0.17	209.8	16	3,356	**8,606**	**51%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	300	1	7	2,100	940	40	224	0.18	167.9	16	2,686	**4,786**	**37%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	750	1	7	5,250	2,190	49	224	0.22	479.1	16	7,665	**12,915**	**89%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	410	30	224	0.13	54.9	16	879	**2,979**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,195	29	224	0.13	154.7	16	2,475	**5,100**	**62%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,650	1	7	11,550	1,155	48	224	0.21	247.5	16	3,960	**15,510**	**48%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,350	1	7	9,450	1,115	51	224	0.23	253.9	16	4,062	**13,512**	**32%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,275	27	224	0.12	153.7	16	2,459	**5,609**	**66%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	885	49	224	0.22	193.6	16	3,098	**5,198**	**33%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	685	42	224	0.19	128.4	16	2,055	**4,155**	**34%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	935	29	224	0.13	121.0	16	1,937	**6,662**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

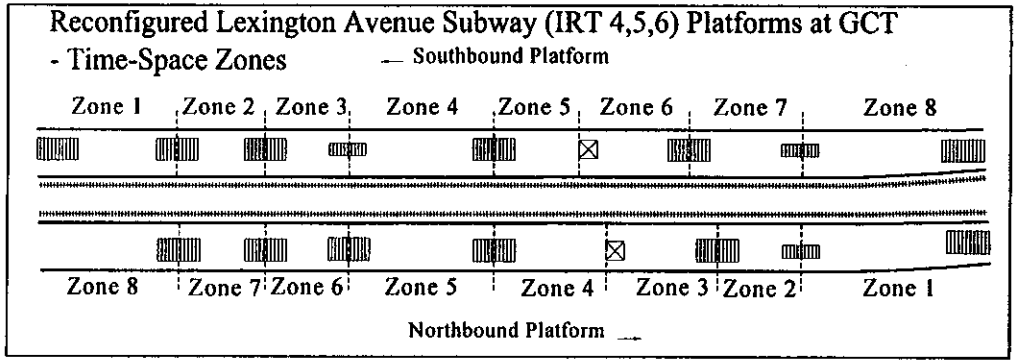


TABLE M-29

2020 MITIGATED BUILD SUBWAY PLATFORM TIME-SPACE ANALYSES

Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	175	1	7	1,225	535	37	224	0.17	88.4	16	1,414	**2,639**	**47%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	330	40	224	0.18	58.9	16	943	**1,293**	**30%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	65	35	224	0.16	10.2	16	163	**1,213**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	450	1	5	2,250	745	49	211	0.23	173.0	13.5	2,336	**4,586**	**95%**	**Mid-D - D/E**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	230	29	224	0.13	29.8	16	476	**1,176**	**43%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	235	48	224	0.21	50.4	16	806	**1,506**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	375	1	7	2,625	930	51	224	0.23	211.7	16	3,388	**6,013**	**43%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	770	27	224	0.12	92.8	16	1,485	**2,360**	**83%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	155	30	224	0.13	20.8	16	332	**682**	**22%**	**C/D or better**
Zone 4	1,050	5	**5,250**	250	1	7	1,750	725	49	224	0.22	158.6	16	2,538	**4,288**	**82%**	**C/D or better**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	465	42	224	0.19	87.2	16	1,395	**2,095**	**52%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	175	1	7	1,225	545	29	224	0.13	70.6	16	1,129	**2,354**	**41%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

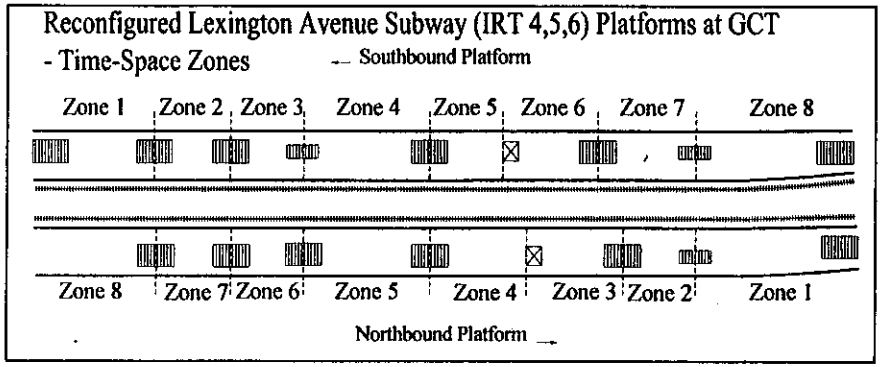


Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) J * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) D + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	525	1	7	3,675	1,385	37	224	0.17	228.8	16	3,660	**7,335**	**44%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	180	26	224	0.12	20.9	16	334	**859**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	870	40	224	0.18	155.4	16	2,486	**3,536**	**27%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,350	1	5	6,750	2,125	49	211	0.23	493.5	13.5	6,662	**13,412**	**92%**	**Mid-D - D/E**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	645	29	224	0.13	83.5	16	1,336	**3,436**	**42%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	670	48	224	0.21	143.6	16	2,297	**4,397**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,200	1	7	8,400	2,490	51	224	0.23	566.9	16	9,071	**17,471**	**41%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,990	27	224	0.12	239.9	16	3,838	**6,463**	**76%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	465	30	224	0.13	62.3	16	996	**2,046**	**22%**	**C/D or better**
Zone 4	1,050	15	**15,750**	750	1	7	5,250	1,795	49	224	0.22	392.7	16	6,283	**11,533**	**73%**	**C/D or better**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,285	42	224	0.19	240.9	16	3,855	**5,955**	**49%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	255	33	224	0.15	37.6	16	601	**3,226**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	525	1	7	3,675	1,425	29	224	0.13	184.5	16	2,952	**6,627**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

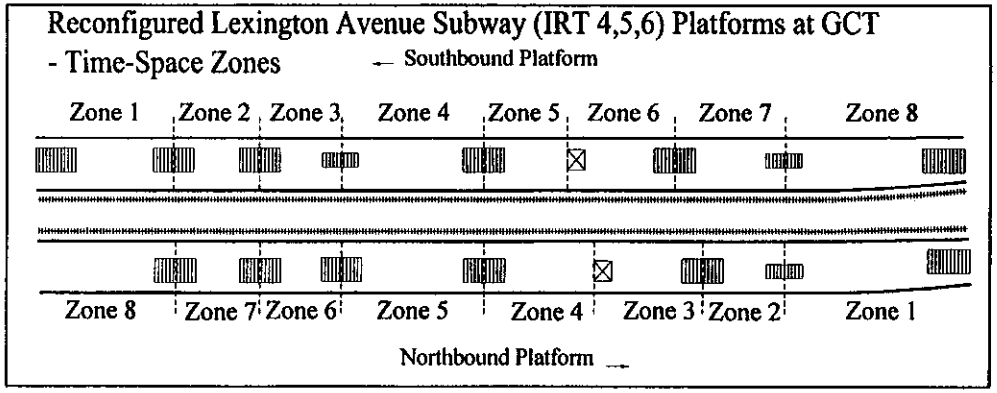


Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	250	1	7	1,750	610	37	224	0.17	100.8	16	1,612	**3,362**	**60%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	60	26	224	0.12	7.0	16	111	**461**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	100	1	7	700	390	40	224	0.18	69.6	16	1,114	**1,814**	**42%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	130	35	224	0.16	20.3	16	325	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	300	1	5	1,500	865	49	211	0.23	200.9	13.5	2,712	**4,212**	**87%**	**Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	480	29	224	0.13	62.1	16	994	**1,869**	**68%**	**C/D or better**
Zone 8	2,165	5	**10,825**	575	1	7	4,025	515	48	224	0.21	110.4	16	1,766	**5,791**	**53%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	450	1	7	3,150	425	51	224	0.23	96.8	16	1,548	**4,698**	**33%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	475	27	224	0.12	57.3	16	916	**1,966**	**69%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**27%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	345	49	224	0.22	75.5	16	1,208	**1,908**	**36%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	115	21	224	0.09	10.8	16	173	**523**	**32%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	270	42	224	0.19	50.6	16	810	**1,510**	**37%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	70	33	224	0.15	10.3	16	165	**1,040**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	250	1	7	1,750	360	29	224	0.13	46.6	16	746	**2,496**	**43%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

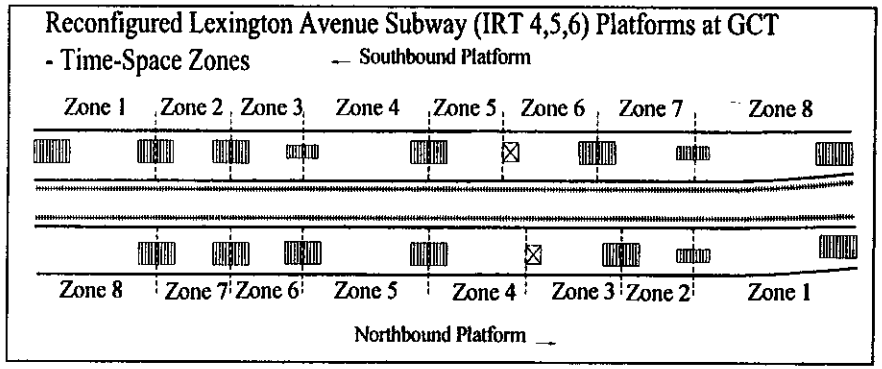


Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	825	1	7	5,775	1,370	37	224	0.17	226.3	16	3,621	**9,396**	**56%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	185	26	224	0.12	21.5	16	344	**1,394**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	300	1	7	2,100	1,010	40	224	0.18	180.4	16	2,886	**4,986**	**38%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	900	1	7	6,300	2,325	49	224	0.22	508.6	16	8,138	**14,438**	**99%**	**C/D - Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,260	29	224	0.13	163.1	16	2,610	**5,235**	**63%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,725	1	7	12,075	1,225	48	224	0.21	262.5	16	4,200	**16,275**	**50%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,425	1	7	9,975	1,180	51	224	0.23	268.7	16	4,299	**14,274**	**34%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,355	27	224	0.12	163.3	16	2,613	**5,763**	**67%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	955	49	224	0.22	208.9	16	3,343	**5,443**	**35%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	225	1	7	1,575	725	42	224	0.19	135.9	16	2,175	**3,750**	**31%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	215	33	224	0.15	31.7	16	507	**3,132**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	750	1	7	5,250	980	29	224	0.13	126.9	16	2,030	**7,280**	**42%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

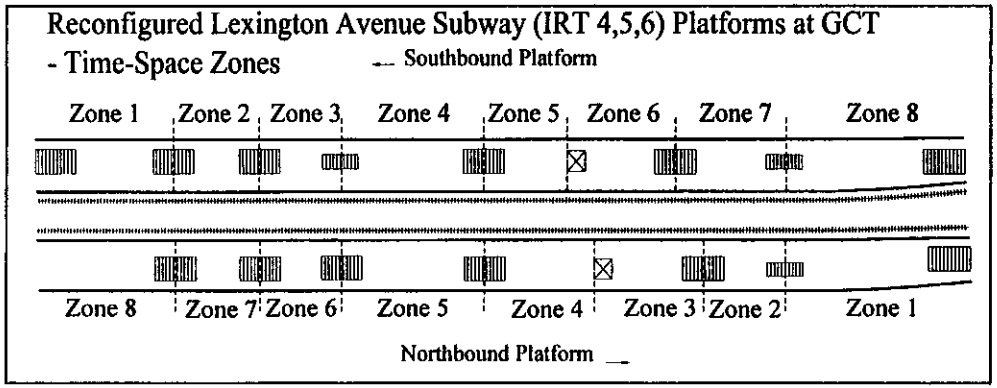


TABLE M-30

LIRR PLATFORM ANALYSES

Table M - 30
PLATFORM STAIRS ANALYSES
LIRR PLATFORMS 1 - 5 @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 5 MINUTES WITHIN PEAK AM PERIOD

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax / min)		
48th Street Stair	285	0	285	6.0	5.5	0	55	1.04	D
47th Street Stair	280	0	280	6.0	5.5	0	55	1.02	D
45th Street Stair	80	0	80	6.0	5.5	0	55	0.29	A
45th Street Escalator	160	0	160	-	-	-	75	0.43	under capacity
43rd Street Stair to 43rd Street Underpass (Plat. 4 / 5)	115	0	115	6.0	5.5	0	55	0.42	A
43rd Street Esc. to Biltmore Room (Plat. 4 / 5)	135	0	135	-	-	-	75	0.36	under capacity
43rd Street Stair to Suburban Concourse (Plat. 1 / 2 / 3)	60	0	60	6.0	5.5	0	55	0.22	A
43rd Street Esc. to Suburban Concourse (Plat. 1 / 2 / 3)	125	0	125	-	-	-	75	0.33	under capacity

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Table M - 30
PLATFORM STAIRS ANALYSES
LIRR PLATFORMS 1 - 5 @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 5 MINUTES WITHIN PEAK AM PERIOD

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax / min)		
48th Street Stair	300	0	300	6.0	5.5	0	55	1.09	D
47th Street Stair	295	0	295	6.0	5.5	0	55	1.07	D
45th Street Stair	85	0	85	6.0	5.5	0	55	0.31	A
45th Street Escalator	170	0	170	-	-	-	75	0.45	under capacity
43rd Street Stair to 43rd Street Underpass (Plat. 4 / 5)	120	0	120	6.0	5.5	0	55	0.44	A
43rd Street Esc. to Biltmore Room (Plat. 4 / 5)	140	0	140	-	-	-	75	0.37	under capacity
43rd Street Stair to Suburban Concourse (Plat. 1 / 2 / 3)	65	0	65	6.0	5.5	0	55	0.24	A
43rd Street Esc. to Suburban Concourse (Plat. 1 / 2 / 3)	130	0	130	-	-	-	75	0.35	under capacity

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

TABLE M-31

GCT EXTERNAL / NEA ANALYSES

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS -- 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 50%
LIRR pax load (one 12-car train): 1,356
MNR pax load (one 10-car train): 1,130

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (pax)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E*F*G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (ft/min)	Average Walk Time (min) J/K	Total Walk Time (sqft-min) I*L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) H+O	Time-Space Required as % of Time-Space Available (sqft-min) P/D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	305	5.0	7.0	10,679	305	100	224	0.45	136.2	16.0	2,179	12,858	31%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	305	5.0	5.0	7,628	305	100	211	0.47	144.6	13.5	1,952	9,579	23%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	305	5.0	2.5	3,814	305	100	174	0.57	175.3	8.5	1,490	5,304	13%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	915	7.5	7.0	48,053	915	100	224	0.45	408.7	16.0	6,538	54,592	43%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	915	7.5	5.0	34,324	915	100	211	0.47	433.8	13.5	5,856	40,179	32%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	915	7.5	2.5	17,162	915	100	174	0.57	526.0	8.5	4,471	21,633	17%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	27.1%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	606	5.0	7.0	21,207	606	320	224	1.43	865.7	16.0	13,851	35,057	39%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	606	5.0	5.0	15,148	606	320	211	1.52	918.8	13.5	12,404	27,552	31%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	606	5.0	2.5	7,574	606	320	174	1.84	1,114.3	8.5	9,472	17,045	19%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	1,818	7.5	7.0	95,430	1,818	320	224	1.43	2,597.0	16.0	41,552	136,982	51%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	1,818	7.5	5.0	68,164	1,818	320	211	1.52	2,756.5	13.5	37,212	105,377	39%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	1,818	7.5	2.5	34,082	1,818	320	174	1.84	3,342.9	8.5	28,415	62,497	23%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	27.1%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	409	5.0	7.0	14,317	409	318	224	1.42	581.4	16.0	9,302	23,618	51%	OK
2	8,800	5.0	44,000	197	5.0	7.0	6,890	197	320	224	1.43	281.3	16.0	4,500	11,390	26%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	409	5.0	5.0	10,226	409	318	211	1.51	617.1	13.5	8,330	18,556	40%	OK
2	8,800	5.0	44,000	197	5.0	5.0	4,922	197	320	224	1.43	281.3	13.5	3,797	8,719	20%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	409	5.0	2.5	5,113	409	318	174	1.83	748.3	8.5	6,361	11,474	25%	OK
2	8,800	5.0	44,000	197	5.0	2.5	2,461	197	320	224	1.43	281.3	8.5	2,391	4,851	11%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,227	7.5	7.0	64,424	1,227	318	224	1.42	1,744.1	16.0	27,905	92,330	67%	OK
2	8,800	15.0	132,000	591	7.5	7.0	31,006	591	320	224	1.43	843.8	16.0	13,500	44,506	34%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,227	7.5	5.0	46,017	1,227	318	224	1.42	1,744.1	13.5	23,545	69,562	50%	OK
2	8,800	15.0	132,000	591	7.5	5.0	22,147	591	320	224	1.43	843.8	13.5	11,391	33,538	25%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,227	7.5	2.5	23,009	1,227	318	174	1.83	2,245.0	8.5	19,083	42,092	31%	OK
2	8,800	15.0	132,000	591	7.5	2.5	11,073	591	320	224	1.43	843.8	8.5	7,172	18,246	14%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	130	5.0	7.0	4,556	130	100	224	0.45	58.1	16.0	930	5,486	25%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	130	5.0	5.0	3,254	130	100	211	0.47	61.7	13.5	833	4,087	19%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	130	5.0	2.5	1,627	130	100	174	0.57	74.8	8.5	636	2,263	10%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	391	7.5	7.0	20,503	391	100	224	0.45	174.4	16.0	2,790	23,292	35%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	391	7.5	5.0	14,645	391	100	211	0.47	185.1	13.5	2,498	17,143	26%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	391	7.5	2.5	7,322	391	100	174	0.57	224.4	8.5	1,908	9,230	14%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 75%
LIRR pax load (one 12-car train): 1,356
MNR pax load (one 10-car train): 1,130

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (pax)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E*F*G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (sqft-min) I*L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) E+O	Time-Space Required as % of Time-Space Available (sqft-min) P/D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	458	5.0	7.0	16,018	458	100	224	0.45	204.3	16.0	3,269	19,287	46%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	458	5.0	5.0	11,441	458	100	211	0.47	216.9	13.5	2,928	14,369	34%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	458	5.0	2.5	5,721	458	100	174	0.57	263.0	8.5	2,236	7,956	19%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	1,373	7.5	7.0	72,080	1,373	100	224	0.45	613.0	16.0	9,808	81,888	65%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	1,373	7.5	5.0	51,486	1,373	100	211	0.47	650.6	13.5	8,783	60,269	48%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	1,373	7.5	2.5	25,743	1,373	100	174	0.57	789.1	8.5	6,707	32,450	26%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	27.1%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	909	5.0	7.0	31,810	909	320	224	1.43	1,298.5	16.0	20,776	52,586	58%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	909	5.0	5.0	22,721	909	320	211	1.52	1,378.2	13.5	18,606	41,328	46%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	909	5.0	2.5	11,361	909	320	174	1.84	1,671.5	8.5	14,207	25,568	28%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	2,727	7.5	7.0	143,145	2,727	320	224	1.43	3,895.5	16.0	62,327	205,473	76%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	2,727	7.5	5.0	102,247	2,727	320	211	1.52	4,134.7	13.5	55,818	158,065	59%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	2,727	7.5	2.5	51,123	2,727	320	174	1.84	5,014.4	8.5	42,622	93,746	35%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	27.1%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	614	5.0	7.0	21,475	614	318	224	1.42	872.0	16.0	13,953	35,427	77%	OK
2	8,800	5.0	44,000	295	5.0	7.0	10,335	295	320	224	1.43	421.9	16.0	6,750	17,085	39%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	614	5.0	5.0	15,339	614	318	211	1.51	925.6	13.5	12,495	27,835	61%	OK
2	8,800	5.0	44,000	295	5.0	5.0	7,382	295	320	224	1.43	421.9	13.5	5,695	13,078	30%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	614	5.0	2.5	7,670	614	318	174	1.83	1,122.5	8.5	9,541	17,211	37%	OK
2	8,800	5.0	44,000	295	5.0	2.5	3,691	295	320	224	1.43	421.9	8.5	3,586	7,277	17%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,841	7.5	7.0	96,637	1,841	318	224	1.42	2,616.1	16.0	41,858	138,494	100%	OK
2	8,800	15.0	132,000	886	7.5	7.0	46,509	886	320	224	1.43	1,265.7	16.0	20,250	66,759	51%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,841	7.5	5.0	69,026	1,841	318	224	1.42	2,616.1	13.5	35,317	104,344	76%	OK
2	8,800	15.0	132,000	886	7.5	5.0	33,220	886	320	224	1.43	1,265.7	13.5	17,086	50,307	38%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,841	7.5	2.5	34,513	1,841	318	174	1.83	3,367.6	8.5	28,624	63,137	46%	OK
2	8,800	15.0	132,000	886	7.5	2.5	16,610	886	320	224	1.43	1,265.7	8.5	10,758	27,368	21%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	195	5.0	7.0	6,834	195	100	224	0.45	87.2	16.0	1,395	8,229	37%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	195	5.0	5.0	4,882	195	100	211	0.47	92.5	13.5	1,249	6,131	28%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	195	5.0	2.5	2,441	195	100	174	0.57	112.2	8.5	954	3,395	15%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	586	7.5	7.0	30,754	586	100	224	0.45	261.5	16.0	4,185	34,939	53%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	586	7.5	5.0	21,967	586	100	211	0.47	277.6	13.5	3,748	25,715	39%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	586	7.5	2.5	10,984	586	100	174	0.57	336.7	8.5	2,862	13,845	21%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 75%
LIRR pax load (one 12-car train): 1,254
MNR pax load (one 10-car train): 1,045

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (sec)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (pax)	Average Walk Time (2) (sec)	Average Walk Space (3) (sqft/pax)	Total Walk Time - Space (sqft-min) E*F*G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (pax-min) I*L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) H+O	Time-Space Required as % of Time-Space Available (sqft-min) P/D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	423	5.0	7.0	14,816	423	100	224	0.45	189.0	16.0	3,024	17,840	42%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	423	5.0	5.0	10,583	423	100	211	0.47	200.6	13.5	2,708	13,291	32%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	423	5.0	2.5	5,292	423	100	174	0.57	243.3	8.5	2,068	7,360	18%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	1,270	7.5	7.0	66,674	1,270	100	224	0.45	567.0	16.0	9,072	75,746	60%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	1,270	7.5	5.0	47,624	1,270	100	211	0.47	601.8	13.5	8,125	55,749	44%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	1,270	7.5	2.5	23,812	1,270	100	174	0.57	729.9	8.5	6,204	30,016	24%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	40.0%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	1,043	5.0	7.0	36,503	1,043	320	224	1.43	1,490.1	16.0	23,841	60,344	67%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	1,043	5.0	5.0	26,074	1,043	320	211	1.52	1,581.6	13.5	21,351	47,425	53%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	1,043	5.0	2.5	13,037	1,043	320	174	1.84	1,918.1	8.5	16,304	29,340	33%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	3,129	7.5	7.0	164,265	3,129	320	224	1.43	4,470.2	16.0	71,523	235,788	87%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	3,129	7.5	5.0	117,332	3,129	320	211	1.52	4,744.7	13.5	64,054	181,386	67%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	3,129	7.5	2.5	58,666	3,129	320	174	1.84	5,754.2	8.5	48,911	107,577	40%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	40.0%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	640	5.0	7.0	22,392	640	318	224	1.42	909.3	16.0	14,549	36,941	80%	OK
2	8,800	5.0	44,000	403	5.0	7.0	14,111	403	320	224	1.43	576.0	16.0	9,216	23,327	53%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	640	5.0	5.0	15,995	640	318	211	1.51	965.1	13.5	13,029	29,024	63%	OK
2	8,800	5.0	44,000	403	5.0	5.0	10,079	403	320	224	1.43	576.0	13.5	7,776	17,855	41%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	640	5.0	2.5	7,997	640	318	174	1.83	1,170.5	8.5	9,949	17,946	39%	OK
2	8,800	5.0	44,000	403	5.0	2.5	5,040	403	320	224	1.43	576.0	8.5	4,896	9,936	23%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,919	7.5	7.0	100,766	1,919	318	224	1.42	2,727.9	16.0	43,646	144,412	105%	fails
2	8,800	15.0	132,000	1,210	7.5	7.0	63,499	1,210	320	224	1.43	1,728.0	16.0	27,648	91,147	69%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,919	7.5	5.0	71,976	1,919	318	224	1.42	2,727.9	13.5	36,826	108,802	79%	OK
2	8,800	15.0	132,000	1,210	7.5	5.0	45,356	1,210	320	224	1.43	1,728.0	13.5	23,328	68,685	52%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,919	7.5	2.5	35,988	1,919	318	174	1.83	3,511.5	8.5	29,847	65,835	48%	OK
2	8,800	15.0	132,000	1,210	7.5	2.5	22,678	1,210	320	224	1.43	1,728.0	8.5	14,688	37,366	28%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	181	5.0	7.0	6,322	181	100	224	0.45	80.6	16.0	1,290	7,612	35%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	181	5.0	5.0	4,515	181	100	211	0.47	85.6	13.5	1,156	5,671	26%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	181	5.0	2.5	2,258	181	100	174	0.57	103.8	8.5	882	3,140	14%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	542	7.5	7.0	28,448	542	100	224	0.45	241.9	16.0	3,871	32,318	49%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	542	7.5	5.0	20,320	542	100	211	0.47	256.8	13.5	3,467	23,786	36%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	542	7.5	2.5	10,160	542	100	174	0.57	311.4	8.5	2,647	12,807	19%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 50%
LIRR pax load (one 12-car train): 1,254
MNR pax load (one 10-car train): 1,045

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (pax)	Average Walk Time (2) (min)	Average Walk Space (3) (sqft/pax)	Total Walk Time - Space (sqft-min) E * F * G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time - Space (sqft-min) I * L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) E + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	282	5.0	7.0	9,878	282	100	224	0.45	126.0	16.0	2,016	11,894	28%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	282	5.0	5.0	7,055	282	100	211	0.47	133.7	13.5	1,805	8,861	21%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	282	5.0	2.5	3,528	282	100	174	0.57	162.2	8.5	1,379	4,906	12%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	847	7.5	7.0	44,449	847	100	224	0.45	378.0	16.0	6,048	50,497	40%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	847	7.5	5.0	31,749	847	100	211	0.47	401.2	13.5	5,416	37,166	29%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	847	7.5	2.5	15,875	847	100	174	0.57	486.6	8.5	4,136	20,011	16%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	40.0%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	695	5.0	7.0	24,336	695	320	224	1.43	993.4	16.0	15,894	40,230	45%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	695	5.0	5.0	17,383	695	320	211	1.52	1,054.4	13.5	14,234	31,617	35%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	695	5.0	2.5	8,691	695	320	174	1.84	1,278.7	8.5	10,869	19,560	22%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	2,086	7.5	7.0	109,510	2,086	320	224	1.43	2,980.1	16.0	47,682	157,192	58%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	2,086	7.5	5.0	78,221	2,086	320	211	1.52	3,163.2	13.5	42,703	120,924	45%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	2,086	7.5	2.5	39,111	2,086	320	174	1.84	3,836.1	8.5	32,607	71,718	27%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	40.0%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	427	5.0	7.0	14,928	427	318	224	1.42	606.2	16.0	9,699	24,627	54%	OK
2	8,800	5.0	44,000	269	5.0	7.0	9,407	269	320	224	1.43	384.0	16.0	6,144	15,551	35%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	427	5.0	5.0	10,663	427	318	211	1.51	643.4	13.5	8,686	19,349	42%	OK
2	8,800	5.0	44,000	269	5.0	5.0	6,719	269	320	224	1.43	384.0	13.5	5,184	11,904	27%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	427	5.0	2.5	5,332	427	318	174	1.83	780.3	8.5	6,633	11,964	26%	OK
2	8,800	5.0	44,000	269	5.0	2.5	3,360	269	320	224	1.43	384.0	8.5	3,264	6,624	15%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,280	7.5	7.0	67,177	1,280	318	224	1.42	1,818.6	16.0	29,097	96,275	70%	OK
2	8,800	15.0	132,000	806	7.5	7.0	42,333	806	320	224	1.43	1,152.0	16.0	18,432	60,765	46%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,280	7.5	5.0	47,984	1,280	318	224	1.42	1,818.6	13.5	24,551	72,535	53%	OK
2	8,800	15.0	132,000	806	7.5	5.0	30,238	806	320	224	1.43	1,152.0	13.5	15,552	45,790	35%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,280	7.5	2.5	23,992	1,280	318	174	1.83	2,341.0	8.5	19,898	43,890	32%	OK
2	8,800	15.0	132,000	806	7.5	2.5	15,119	806	320	224	1.43	1,152.0	8.5	9,792	24,911	19%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	120	5.0	7.0	4,214	120	100	224	0.45	53.8	16.0	860	5,075	23%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	120	5.0	5.0	3,010	120	100	211	0.47	57.1	13.5	770	3,781	17%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	120	5.0	2.5	1,505	120	100	174	0.57	69.2	8.5	588	2,093	10%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	361	7.5	7.0	18,965	361	100	224	0.45	161.3	16.0	2,581	21,546	33%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	361	7.5	5.0	13,546	361	100	211	0.47	171.2	13.5	2,311	15,857	24%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	361	7.5	2.5	6,773	361	100	174	0.57	207.6	8.5	1,765	8,538	13%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 25%
LIRR pax load (one 12-car train): 1,254
MNR pax load (one 10-car train): 1,045

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (pax)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/pax)	Total Wait Time - Space (sqft-min) E*F*G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (ft/min)	Average Walk Time (min) J/K	Total Walk Time - Space (sqft-min) I*L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) H+O	Time-Space Required as % of Time-Space Available (sqft-min) P/D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	141	5.0	7.0	4,939	141	100	224	0.45	63.0	16.0	1,008	5,947	14%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	141	5.0	5.0	3,528	141	100	211	0.47	66.9	13.5	903	4,430	11%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	141	5.0	2.5	1,764	141	100	174	0.57	81.1	8.5	689	2,453	6%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	423	7.5	7.0	22,225	423	100	224	0.45	189.0	16.0	3,024	25,249	20%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	423	7.5	5.0	15,875	423	100	211	0.47	200.6	13.5	2,708	18,583	15%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	423	7.5	2.5	7,937	423	100	174	0.57	243.3	8.5	2,068	10,005	8%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	40.0%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	348	5.0	7.0	12,168	348	320	224	1.43	496.7	16.0	7,947	20,115	22%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	348	5.0	5.0	8,691	348	320	211	1.52	527.2	13.5	7,117	15,808	18%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	348	5.0	2.5	4,346	348	320	174	1.84	639.4	8.5	5,435	9,780	11%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	1,043	7.5	7.0	54,755	1,043	320	224	1.43	1,490.1	16.0	23,841	78,596	29%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	1,043	7.5	5.0	39,111	1,043	320	211	1.52	1,581.6	13.5	21,351	60,462	22%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	1,043	7.5	2.5	19,555	1,043	320	174	1.84	1,918.1	8.5	16,304	35,859	13%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	40.0%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	213	5.0	7.0	7,464	213	318	224	1.42	303.1	16.0	4,850	12,314	27%	OK
2	8,800	5.0	44,000	134	5.0	7.0	4,704	134	320	224	1.43	192.0	16.0	3,072	7,776	18%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	213	5.0	5.0	5,332	213	318	211	1.51	321.7	13.5	4,343	9,675	21%	OK
2	8,800	5.0	44,000	134	5.0	5.0	3,360	134	320	224	1.43	192.0	13.5	2,592	5,952	14%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	213	5.0	2.5	2,666	213	318	174	1.83	390.2	8.5	3,316	5,982	13%	OK
2	8,800	5.0	44,000	134	5.0	2.5	1,680	134	320	224	1.43	192.0	8.5	1,632	3,312	8%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	640	7.5	7.0	33,589	640	318	224	1.42	909.3	16.0	14,549	48,137	35%	OK
2	8,800	15.0	132,000	403	7.5	7.0	21,166	403	320	224	1.43	576.0	16.0	9,216	30,382	23%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	640	7.5	5.0	23,992	640	318	224	1.42	909.3	13.5	12,275	36,267	26%	OK
2	8,800	15.0	132,000	403	7.5	5.0	15,119	403	320	224	1.43	576.0	13.5	7,776	22,895	17%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	640	7.5	2.5	11,996	640	318	174	1.83	1,170.5	8.5	9,949	21,945	16%	OK
2	8,800	15.0	132,000	403	7.5	2.5	7,559	403	320	224	1.43	576.0	8.5	4,896	12,455	9%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	60	5.0	7.0	2,107	60	100	224	0.45	26.9	16.0	430	2,537	12%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	60	5.0	5.0	1,505	60	100	211	0.47	28.5	13.5	385	1,890	9%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	60	5.0	2.5	753	60	100	174	0.57	34.6	8.5	294	1,047	5%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	181	7.5	7.0	9,483	181	100	224	0.45	80.6	16.0	1,290	10,773	16%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	181	7.5	5.0	6,773	181	100	211	0.47	85.6	13.5	1,156	7,929	12%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	181	7.5	2.5	3,387	181	100	174	0.57	103.8	8.5	882	4,269	6%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31

TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 25%
LIRR pax load (one 12-car train): 1,356
MNR pax load (one 10-car train): 1,130

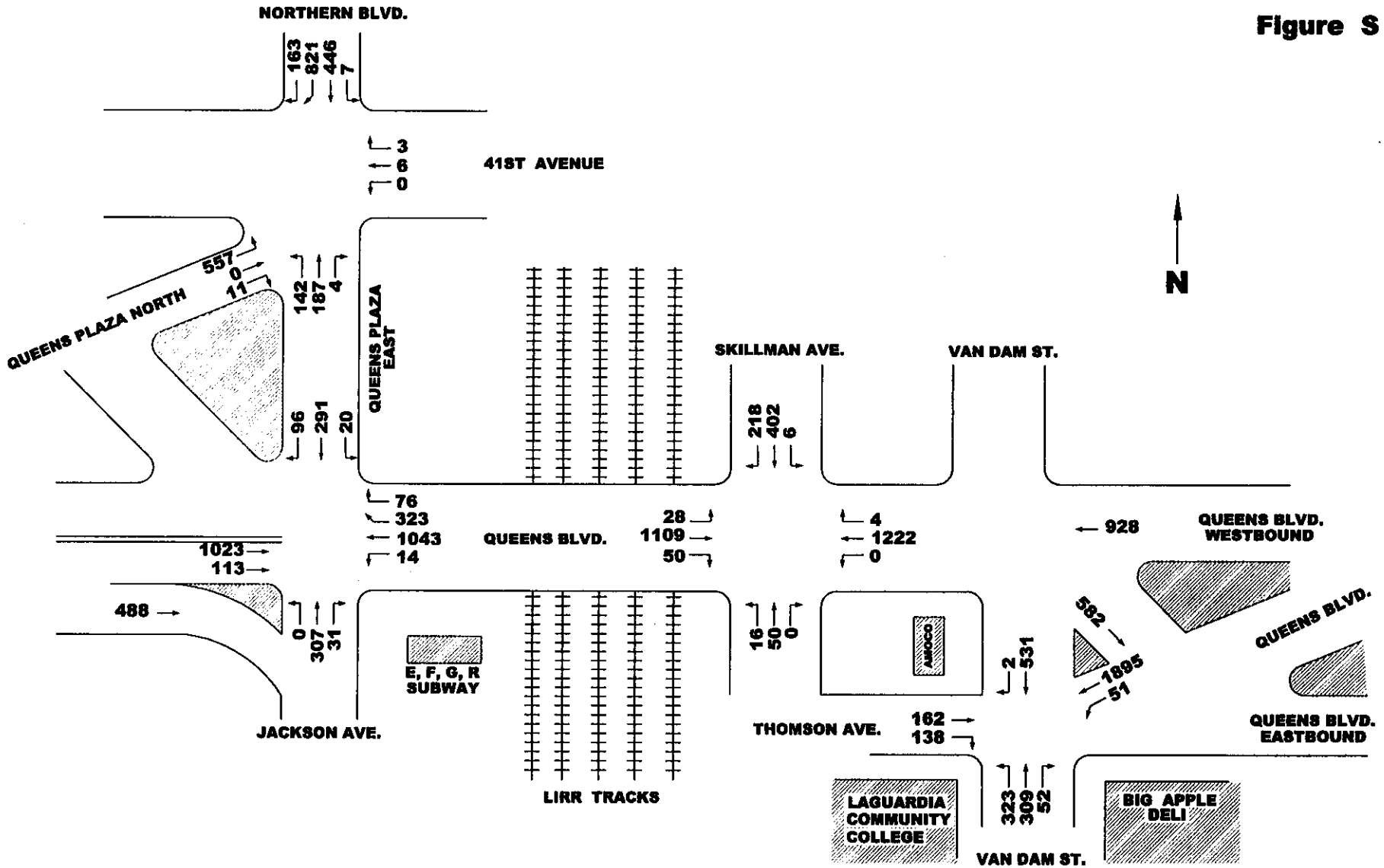
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B*C	Number of Pax Waiting (pax)	Average Walk Time (2) (min)	Average Walk Space (3) (sqft/pax)	Total Walk Time - Space (sqft-min) E*F*G	Total Pax Volume (pax)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J/K	Total Walk Time (pax-min) I*L	Average Walk Space (6) (sqft/pax)	Total Walk Time - Space (sqft-min) M*N	Total Time - Space Required (sqft-min) H+O	Time-Space Required as % of Time-Space Available (%) P/D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	153	5.0	7.0	5,339	153	100	224	0.45	68.1	16.0	1,090	6,429	15%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	153	5.0	5.0	3,814	153	100	211	0.47	72.3	13.5	976	4,790	11%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	153	5.0	2.5	1,907	153	100	174	0.57	87.7	8.5	745	2,652	6%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	458	7.5	7.0	24,027	458	100	224	0.45	204.3	16.0	3,269	27,296	22%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	458	7.5	5.0	17,162	458	100	211	0.47	216.9	13.5	2,928	20,090	16%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	458	7.5	2.5	8,581	458	100	174	0.57	263.0	8.5	2,236	10,817	9%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	27.1%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	303	5.0	7.0	10,603	303	320	224	1.43	432.8	16.0	6,925	17,529	19%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	303	5.0	5.0	7,574	303	320	211	1.52	459.4	13.5	6,202	13,776	15%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	303	5.0	2.5	3,787	303	320	174	1.84	557.2	8.5	4,736	8,523	9%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	909	7.5	7.0	47,715	909	320	224	1.43	1,298.5	16.0	20,776	68,491	25%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	909	7.5	5.0	34,082	909	320	211	1.52	1,378.2	13.5	18,606	52,688	20%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	909	7.5	2.5	17,041	909	320	174	1.84	1,671.5	8.5	14,207	31,249	12%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	27.1%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	205	5.0	7.0	7,158	205	318	224	1.42	290.7	16.0	4,651	11,809	26%	OK
2	8,800	5.0	44,000	98	5.0	7.0	3,445	98	320	224	1.43	140.6	16.0	2,250	5,695	13%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	205	5.0	5.0	5,113	205	318	211	1.51	308.5	13.5	4,165	9,278	20%	OK
2	8,800	5.0	44,000	98	5.0	5.0	2,461	98	320	224	1.43	140.6	13.5	1,898	4,359	10%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	205	5.0	2.5	2,557	205	318	174	1.83	374.2	8.5	3,180	5,737	12%	OK
2	8,800	5.0	44,000	98	5.0	2.5	1,230	98	320	224	1.43	140.6	8.5	1,195	2,426	6%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	614	7.5	7.0	32,212	614	318	224	1.42	872.0	16.0	13,953	46,165	33%	OK
2	8,800	15.0	132,000	295	7.5	7.0	15,503	295	320	224	1.43	421.9	16.0	6,750	22,253	17%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	614	7.5	5.0	23,009	614	318	224	1.42	872.0	13.5	11,772	34,781	25%	OK
2	8,800	15.0	132,000	295	7.5	5.0	11,073	295	320	224	1.43	421.9	13.5	5,695	16,769	13%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	614	7.5	2.5	11,504	614	318	174	1.83	1,122.5	8.5	9,541	21,046	15%	OK
2	8,800	15.0	132,000	295	7.5	2.5	5,537	295	320	224	1.43	421.9	8.5	3,586	9,123	7%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	65	5.0	7.0	2,278	65	100	224	0.45	29.1	16.0	465	2,743	12%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	65	5.0	5.0	1,627	65	100	211	0.47	30.8	13.5	416	2,044	9%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	65	5.0	2.5	814	65	100	174	0.57	37.4	8.5	318	1,132	5%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	195	7.5	7.0	10,251	195	100	224	0.45	87.2	16.0	1,395	11,646	18%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	195	7.5	5.0	7,322	195	100	211	0.47	92.5	13.5	1,249	8,572	13%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	195	7.5	2.5	3,661	195	100	174	0.57	112.2	8.5	954	4,615	7%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

FIGURE S-1

EXISTING SUNNYSIDE AREA TRAFFIC VOLUMES

Figure S - 1



SUNNYSIDE

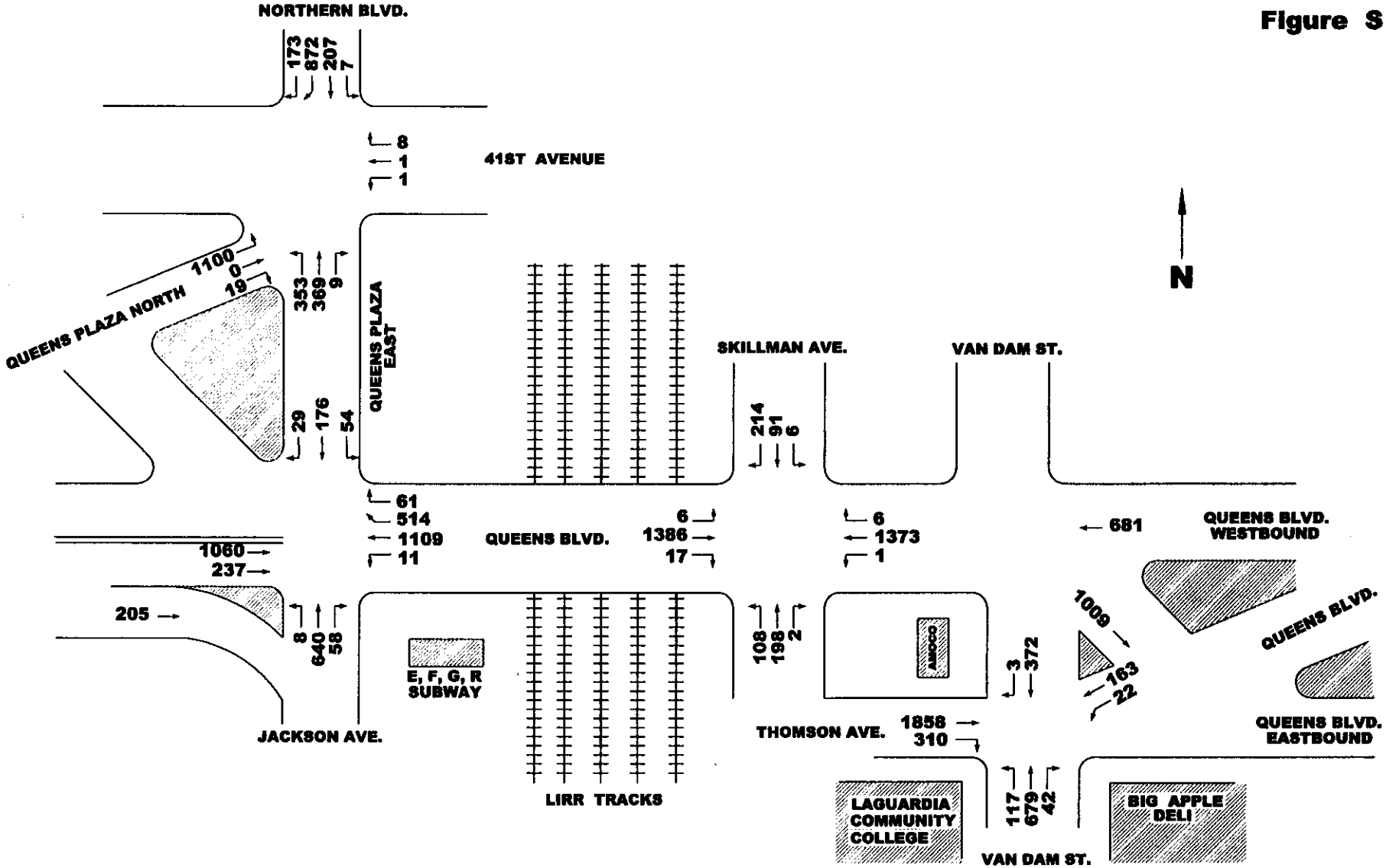
AM Peak Period

1999 Existing Traffic Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 1



SUNNYSIDE

PM Peak Period

1999 Existing Traffic Flows

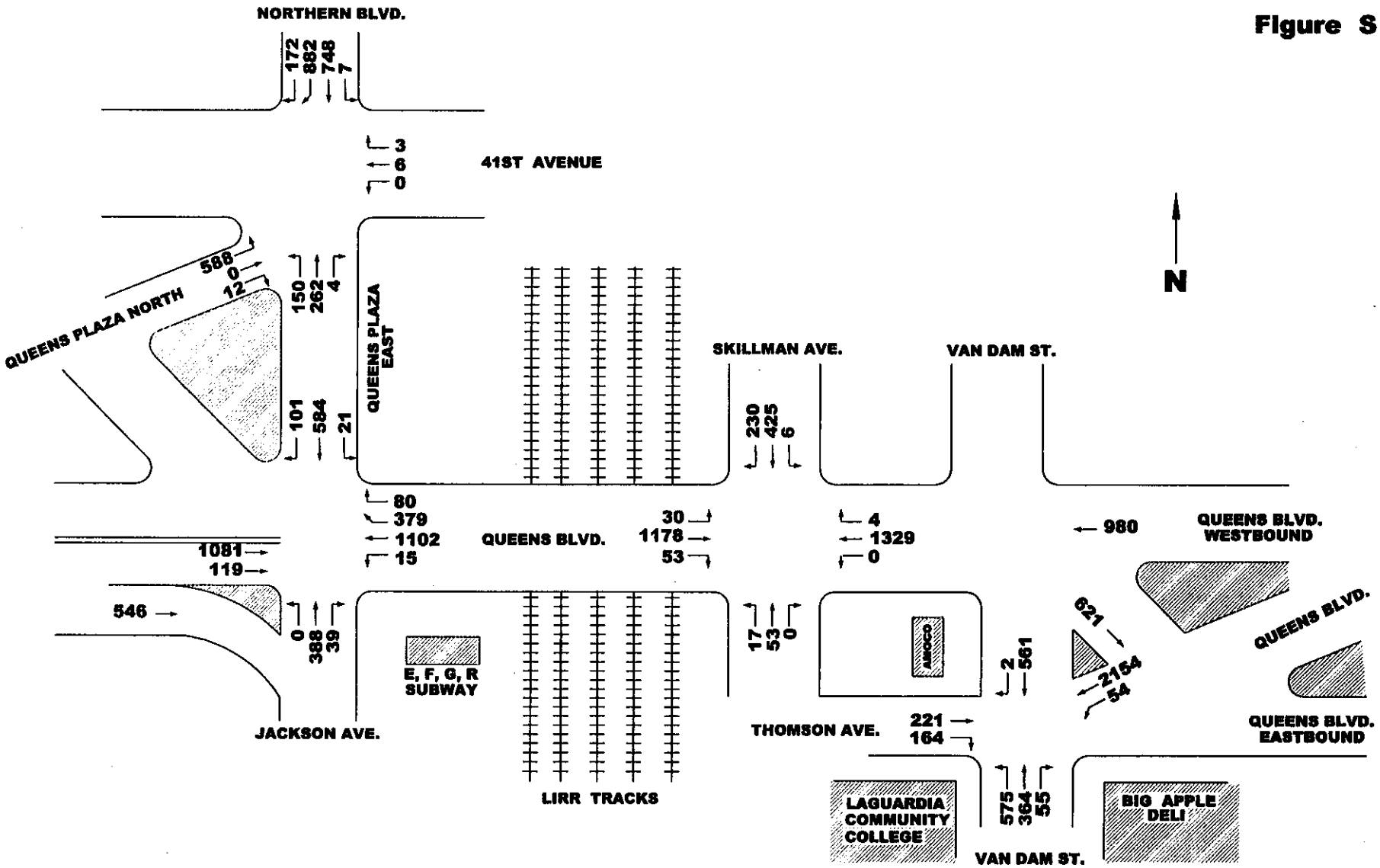
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE S-2

2010 NO BUILD SUNNYSIDE AREA TRAFFIC VOLUMES

Figure S - 2



SUNNYSIDE

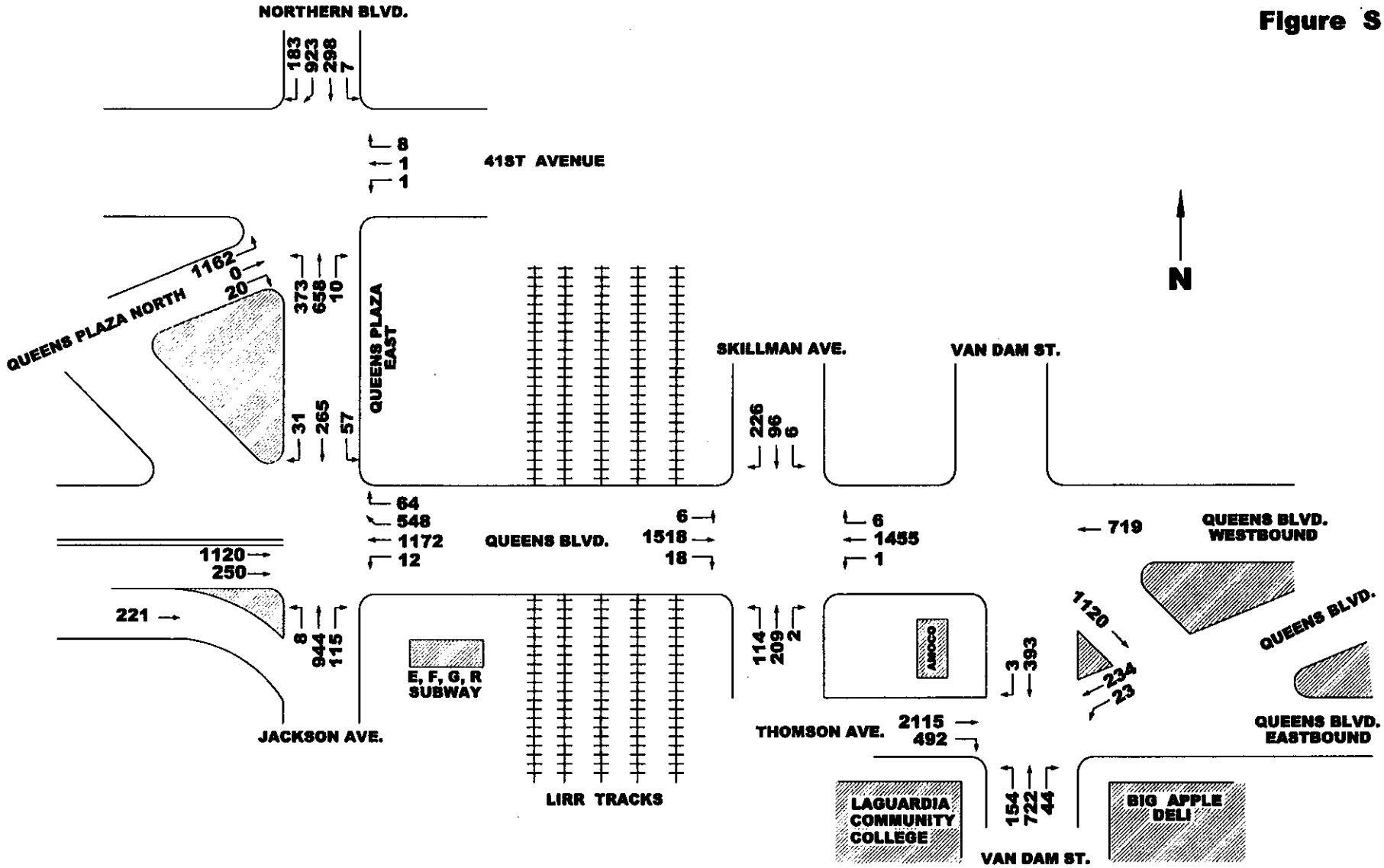
AM Peak Period

2010 No Build Traffic Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 2



SUNNYSIDE

PM Peak Period

2010 No Build Traffic Flows

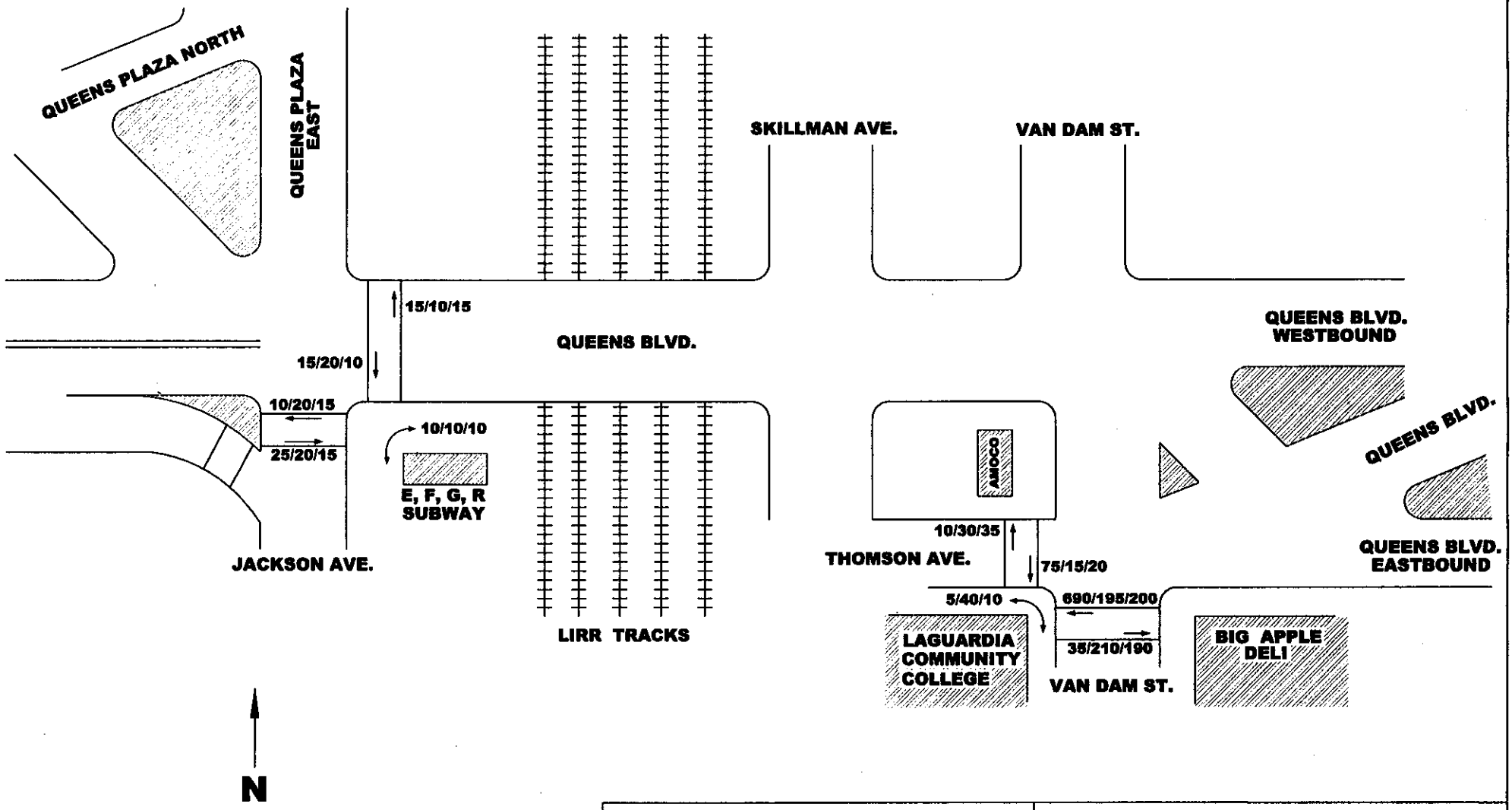
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE S-3

SUNNYSIDE
PEDESTRIAN VOLUMES

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

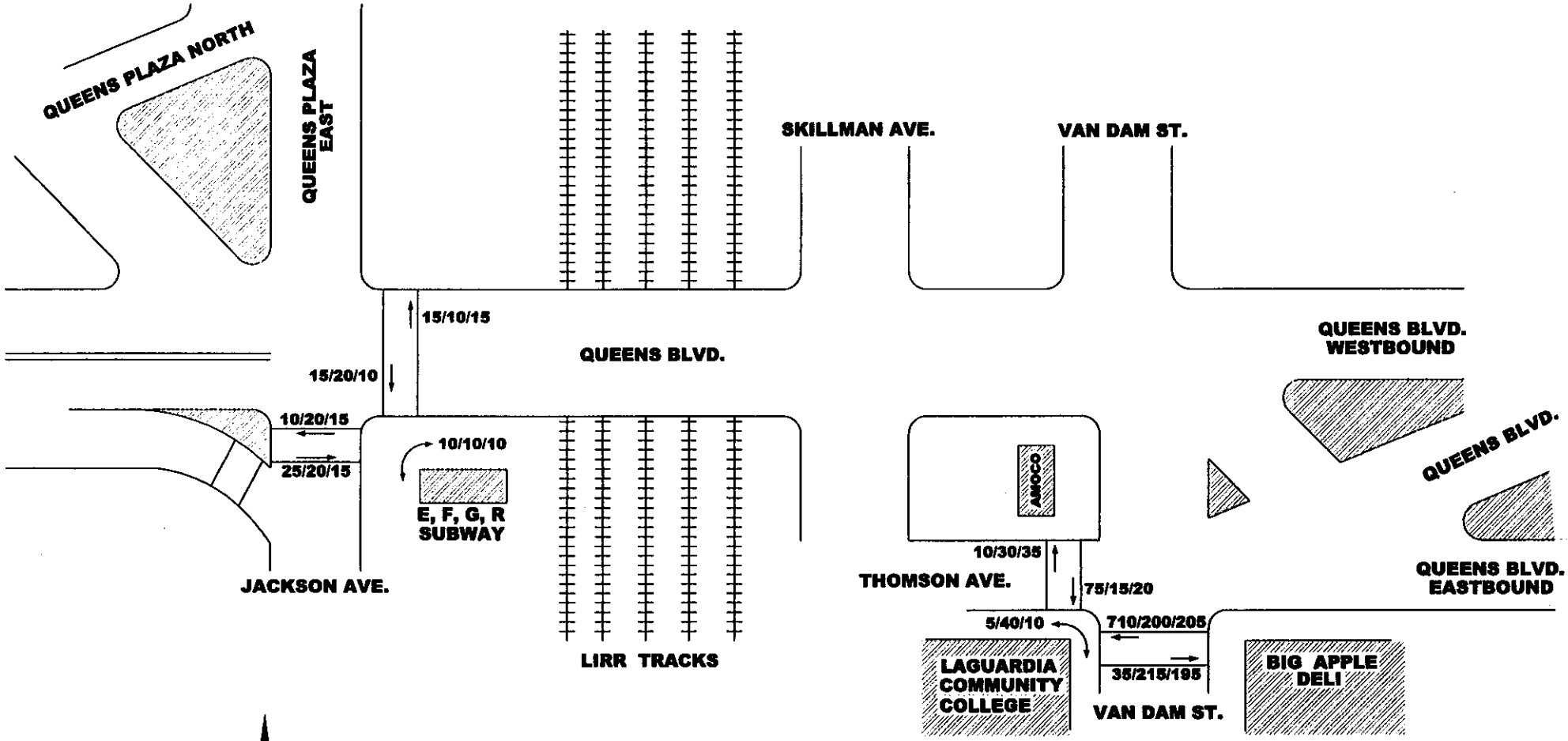
AM, MIDDAY, PM Peak Period

Existing Pedestrian Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

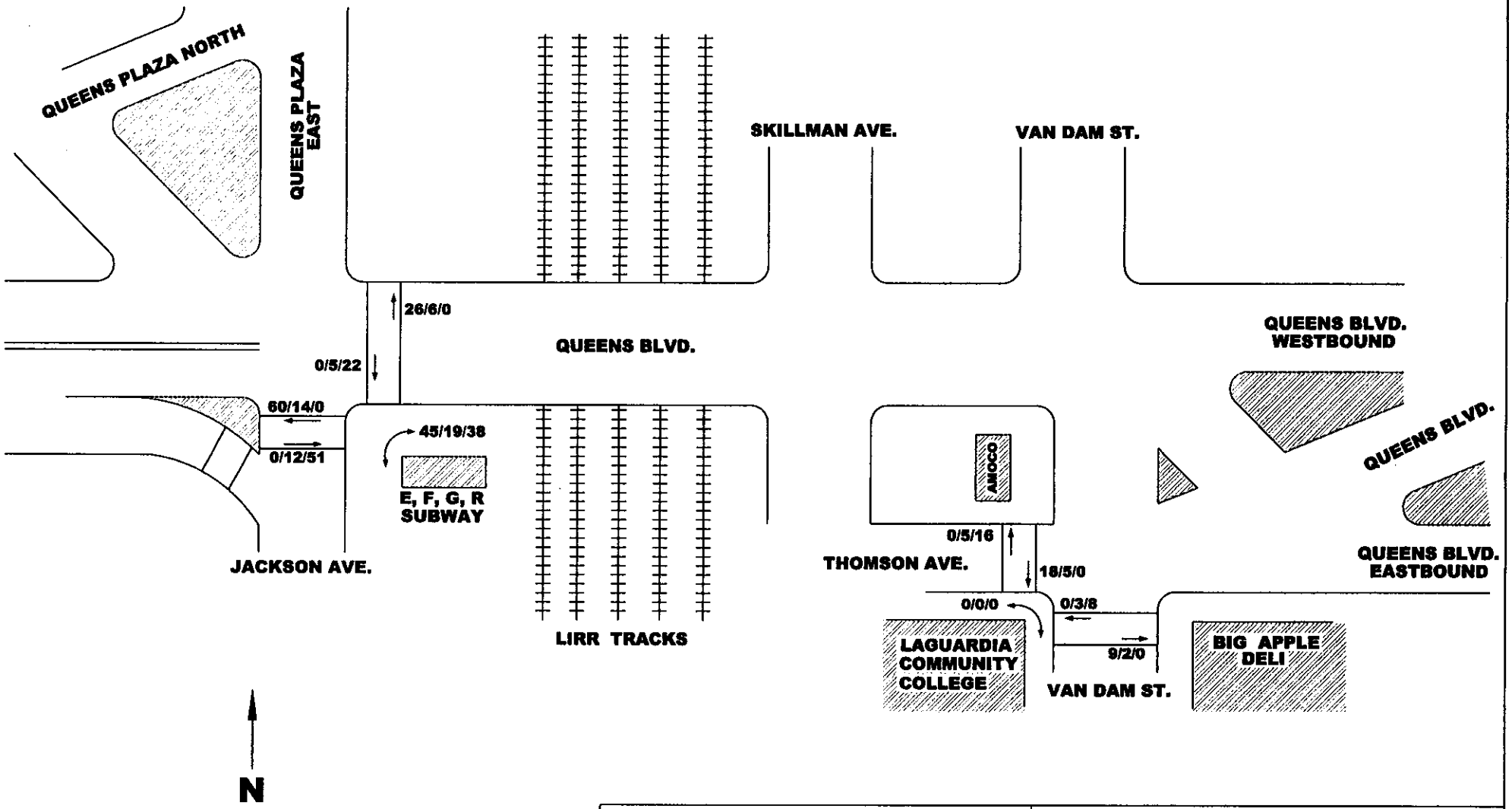
AM, MIDDAY, PM Peak Period

2010 No Build Pedestrian Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

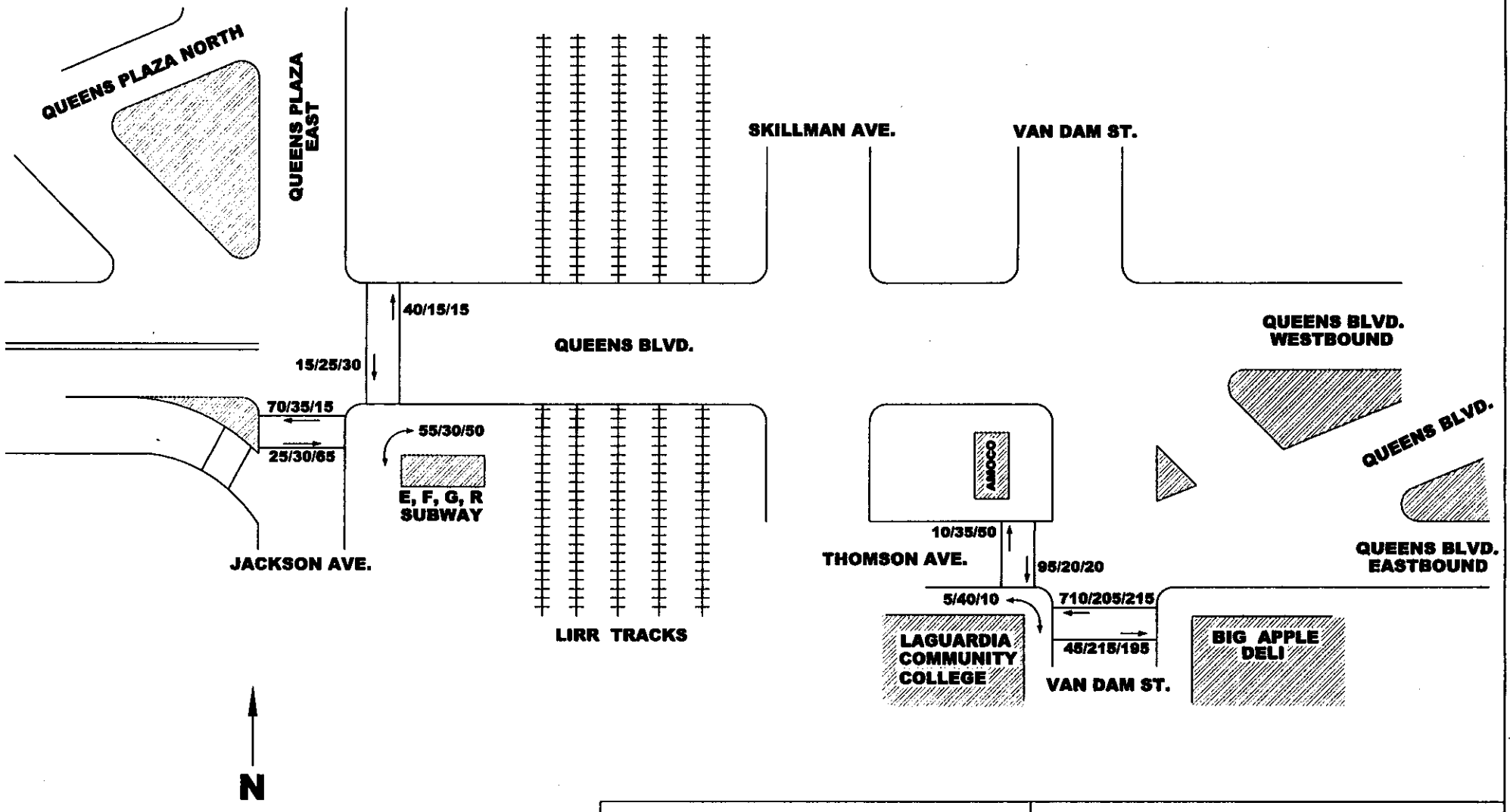
AM, MIDDAY, PM Peak Period

2010 Build Increment

Eng-Wong, Taub & Associates

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Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

AM, MIDDAY, PM Peak Period

2010 Build Pedestrian Flows

Eng-Wong, Taub & Associates

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TABLE S-1

EXISTING SUNNYSIDE TRAFFIC LEVELS OF SERVICE

Table S - 1

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
SUNNYSIDE									
1 Queens Boulevard & Van Dam Street / Thomson Avenue									
Van Dam Street	NB	L	1.04	*	F*	L	0.63	25.7	D
		TR	0.99	66.2	F	TR	1.04	*	F*
Van Dam Street (from viaduct)	SB	TR	1.03	*	F*	TR	0.58	32.3	D
Thomson Avenue	EB	TR	0.18	8.8	B	TR	1.04	42.1	E
Queens Boulevard	EB	T	1.00	64.9	F	T	0.89	29.3	D
Queens Boulevard (to Thomson Avenue)	WB	LT	1.01	40.2	E	DfL	0.37	28.9	D
						T	0.20	25.9	D
Queens Boulevard (to lower level)	WB	R	0.57	7.2	B	R	1.04	*	F*
Overall Intersection		-	*	*	F*	-	*	*	F*
2 Queens Boulevard & Skillman Avenue									
Skillman Avenue	NB	LTR	0.78	50.8	E	LTR	1.03	*	F*
	SB	LTR	1.07	83.1	F	LTR	0.72	36.0	D
Queens Boulevard	EB	LTR	1.04	46.1	E	LTR	1.03	*	F*
	WB	LTR	1.04	*	F*	LTR	1.02	*	F*
Overall Intersection		-	*	*	F*	-	*	*	F*
3 Queens Boulevard & Jackson Avenue / Queens Plaza East									
Jackson Avenue	NB	LT	0.80	41.7	E	LT	0.99	58.6	E
		R	0.18	30.9	D	R	0.21	29.9	D
Queens Plaza East	SB	LTR	0.50	27.1	D	LTR	0.34	24.5	C
Queens Plaza South (2 lane approach)	EB	T	0.80	23.0	C	T	0.92	25.1	D
Queens Plaza South (1 lane approach)		T	0.18	14.2	B	T	0.53	12.3	B
Queens Boulevard	WB	LT	1.06	*	F*	LT	1.03	*	F*
		R	1.00	53.6	E	R	0.85	19.9	C
Overall Intersection		-	*	*	F*	-	*	*	F*
4 Northern Boulevard & Queens Plaza North / 41st Avenue									
Queens Plaza East	NB	LTR	0.96	44.2	E	LTR	0.88	34.0	D
Northern Boulevard	SB	LT	0.94	42.9	E	LT	0.64	32.2	D
		R	1.03	*	F*	R	0.96	21.7	C
Queens Plaza North	EB	LTR	0.86	40.9	E	LTR	0.92	30.5	D
41st Avenue	WB	LTR	0.08	32.7	D	LTR	0.10	36.7	D
Overall Intersection		-	*	*	F*	-	**0.81**	**28.4**	**D**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or I/PHF.

TABLE S-2

2010 NO BUILD SUNNYSIDE LEVELS OF SERVICE

Table S - 2

2010 NO BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
SUNNYSIDE									
1 Queens Boulevard & Van Dam Street / Thomson Avenue									
Van Dam Street	NB	L	1.20+	120.0+	F *	L	0.83	39.1	D
		TR	1.15	120.0+	F *	TR	1.11	120.0+	F *
Van Dam Street (from viaduct)	SB	TR	1.09	120.0+	F *	TR	0.61	32.8	D
Thomson Avenue	EB	TR	0.22	9.1	B	TR	1.26	120.0+	F *
Queens Boulevard	EB	T	1.07	120.0+	F *	T	0.99	42.1	E
Queens Boulevard (to Thomson Avenue)	WB	LT	1.16	120.0+	F *	DfL	0.38	29.3	D
						T	0.29	26.6	D
Queens Boulevard (to lower level)	WB	R	0.60	7.5	B	R	1.09	120.0+	F *
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***
2 Queens Boulevard & Skillman Avenue									
Skillman Avenue	NB	LTR	0.90	72.0	F	LTR	1.09	120.0+	F *
	SB	LTR	1.13	120.0+	F *	LTR	0.77	38.2	D
Queens Boulevard	EB	DfL	0.32	8.0	B	DfL	-	-	-
		TR	1.16	120.0+	F *	TR	1.13	120.0+	
	WB	TR	1.13	120.0+	F*	TR	1.08	120.0+	F *
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***
3 Queens Boulevard & Jackson Avenue / Queens Plaza East									
Jackson Avenue	NB	T	1.01	71.3	F	LT	1.20+	120.0+	F *
		R	0.22	31.2	D	R	0.41	31.8	D
Queens Plaza East	SB	LTR	0.83	34.6	D	LTR	0.54	26.8	D
Queens Plaza South (2 lane approach)	EB	T	0.84	24.8	C	T	0.97	32.7	D
Queens Plaza South (1 lane approach)		T	0.19	14.2	B	T	0.55	12.8	B
Queens Boulevard	WB	LT	1.14	120.0+	F *	LT	1.08	120.0+	F *
		R	1.15	120.0+	F *	R	0.91	25.0	C
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***
4 Northern Boulevard & Queens Plaza North / 41st Avenue									
Queens Plaza East	NB	LTR	1.05	68.7	F	LTR	1.20+	120.0+	F *
Northern Boulevard	SB	LT	1.20+	120.0+	F *	LT	0.97	64.2	F
		R	1.11	120.0+	F *	R	1.01	33.5	D
Queens Plaza North	EB	LTR	0.91	45.4	E	LTR	0.97	37.2	D
41st Avenue	WB	LTR	0.08	32.7	D	LTR	0.10	36.7	D
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE S-3

SUNNYSIDE
PEDESTRIAN ANALYSES

Table S - 3
LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS OF SUNNYSIDE
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
JACKSON AVENUE @ QUEENS PLAZA EAST												
Southeast Corner	585.9	A			550.6	A			675.5	A		
South Crosswalk	633	A	361	A	646	A	332	A	862	A	443	A
East Crosswalk	414	A	326	A	442	A	332	A	531	A	398	A
THOMSON AVENUE @ QUEENS BOULEVARD												
Southwest Corner	67.5	B			92.1	B			102.4	B		
South Crosswalk	35	C	16	D	19	D	21	D	27	C	22	D
West Crosswalk	91	B	126	B	324	A	257	A	242	A	199	A

LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS OF SUNNYSIDE
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

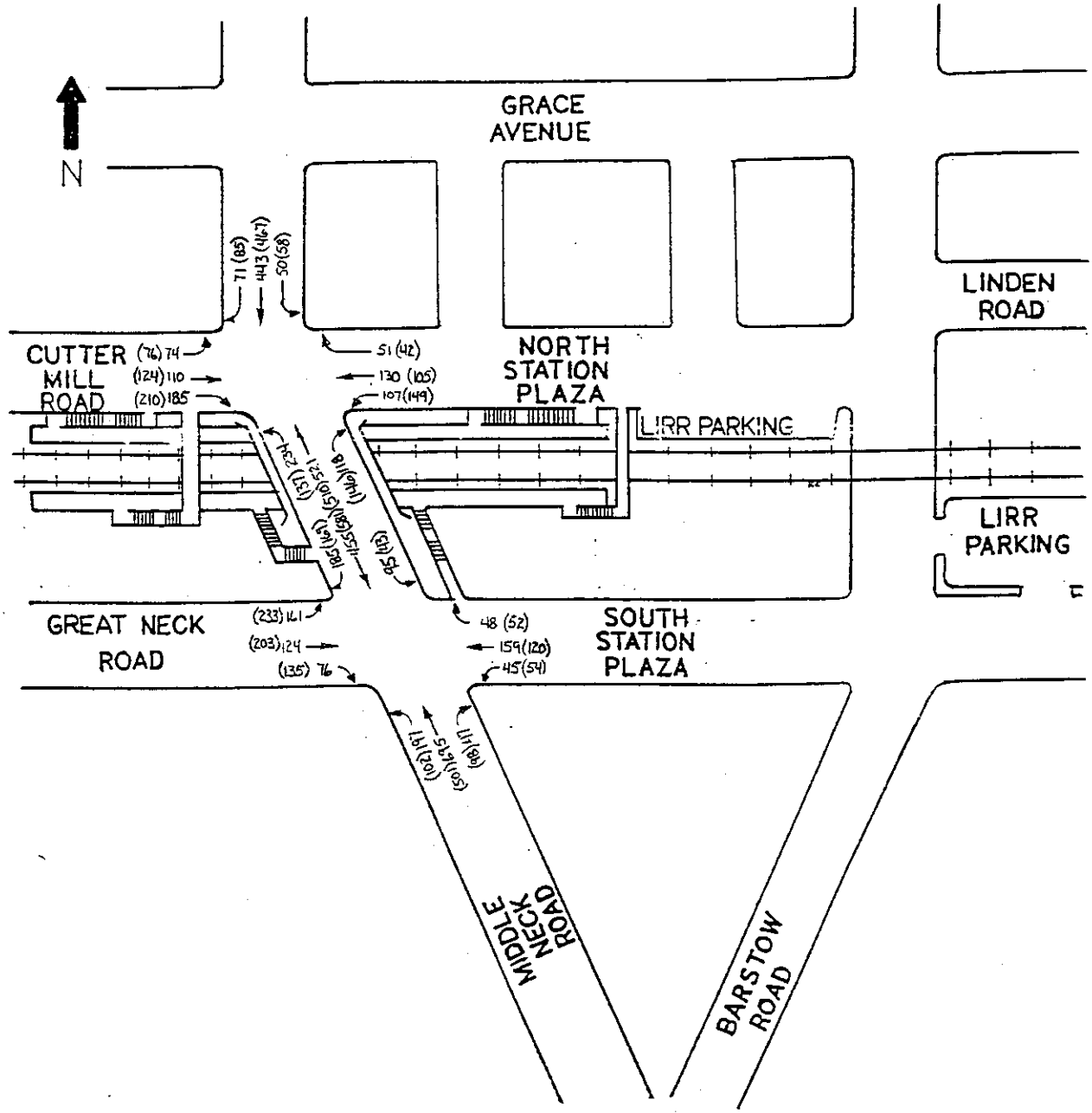
INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
JACKSON AVENUE @ QUEENS PLAZA EAST												
Southeast Corner	585.9	A			550.6	A			675.5	A		
South Crosswalk	627	A	361	A	641	A	332	A	854	A	443	A
East Crosswalk	414	A	326	A	442	A	332	A	531	A	398	A
THOMSON AVENUE @ QUEENS BOULEVARD												
Southwest Corner	65.9	B			89.8	B			99.8	B		
South Crosswalk	34	C	16	D	18	D	20	D	25	C	22	D
West Crosswalk	86	B	126	B	316	A	257	A	242	A	199	A

LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS OF SUNNYSIDE
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
JACKSON AVENUE @ QUEENS PLAZA EAST												
Southeast Corner	202.6	A			322.7	A			250.9	A		
South Crosswalk	231	A	133	A	394	A	204	A	320	A	166	A
East Crosswalk	226	A	178	A	332	A	249	A	295	A	221	A
THOMSON AVENUE @ QUEENS BOULEVARD												
Southwest Corner	63.4	B			86.8	B			93.2	B		
South Crosswalk	34	C	15	D	18	D	20	D	25	C	21	D
West Crosswalk	70	B	102	B	258	A	210	A	190	A	157	A

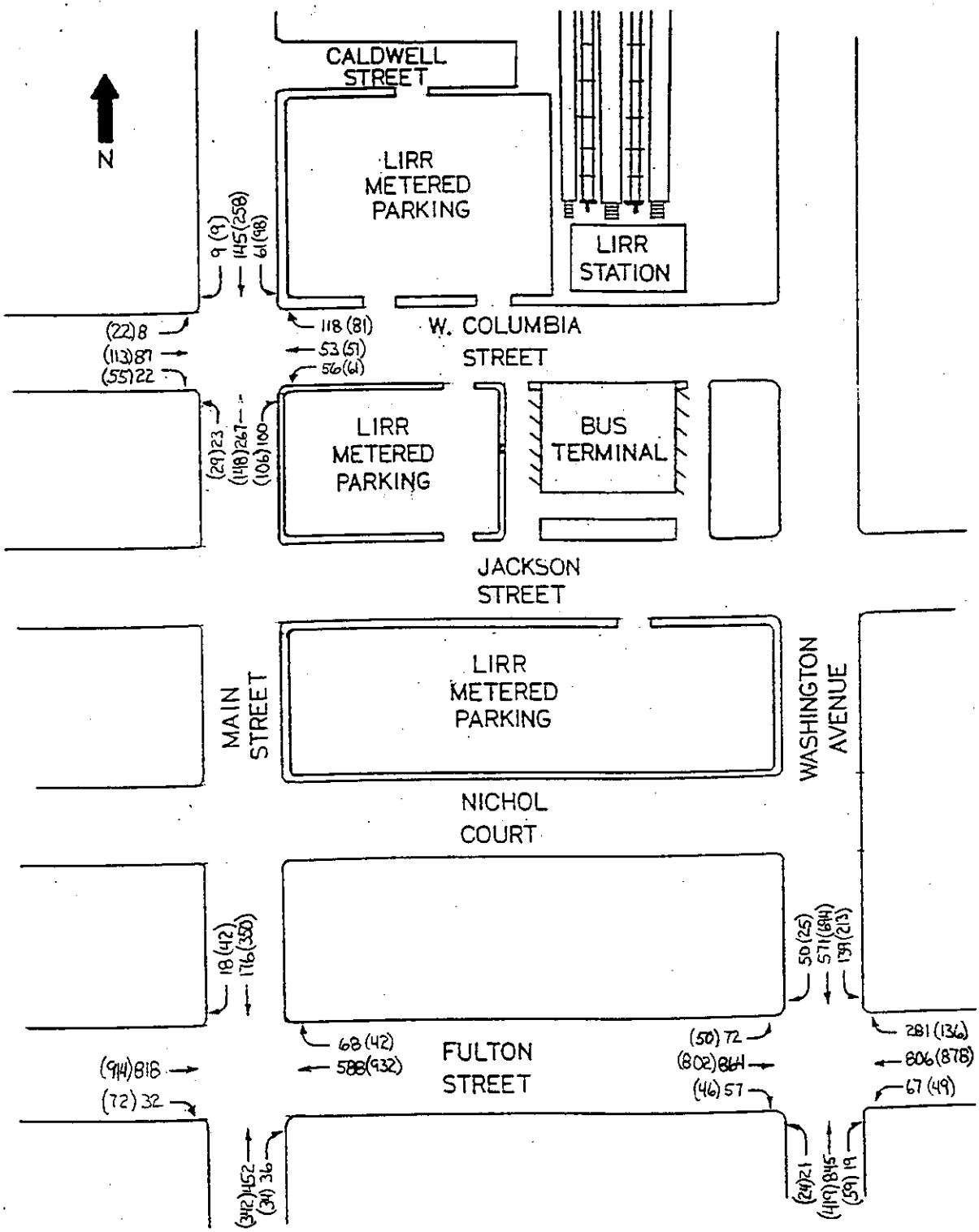
FIGURES L - 1 to L - 15

EXISTING LONG ISLAND RAIL ROAD STATION AREA TRAFFIC VOLUMES



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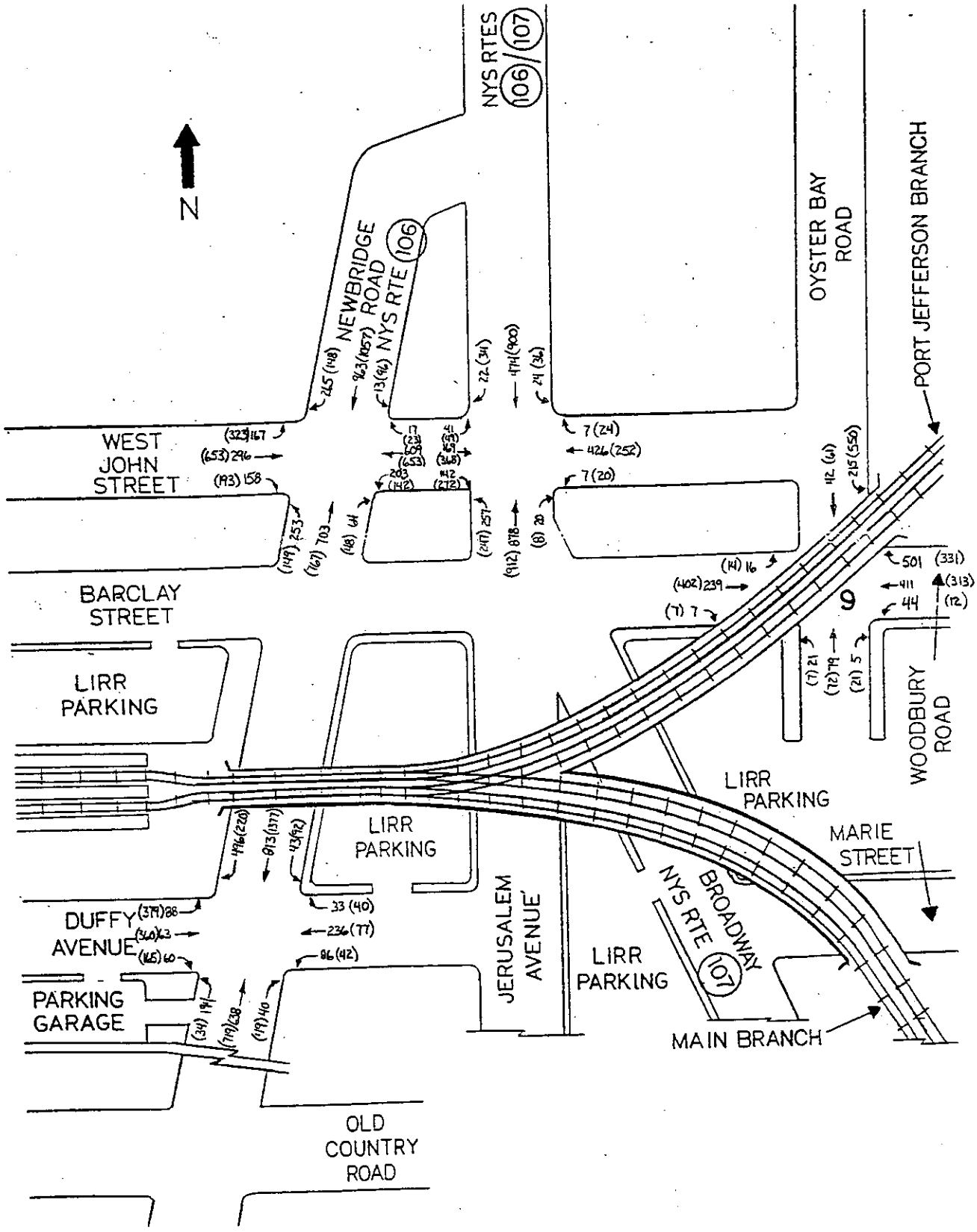
FIGURE L1
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS
GREAT NECK LIRR STATION
GREAT NECK NY 11021



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FIGURE L2
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HEMPSTEAD LIRR STATION
HEMPSTEAD NY 11550

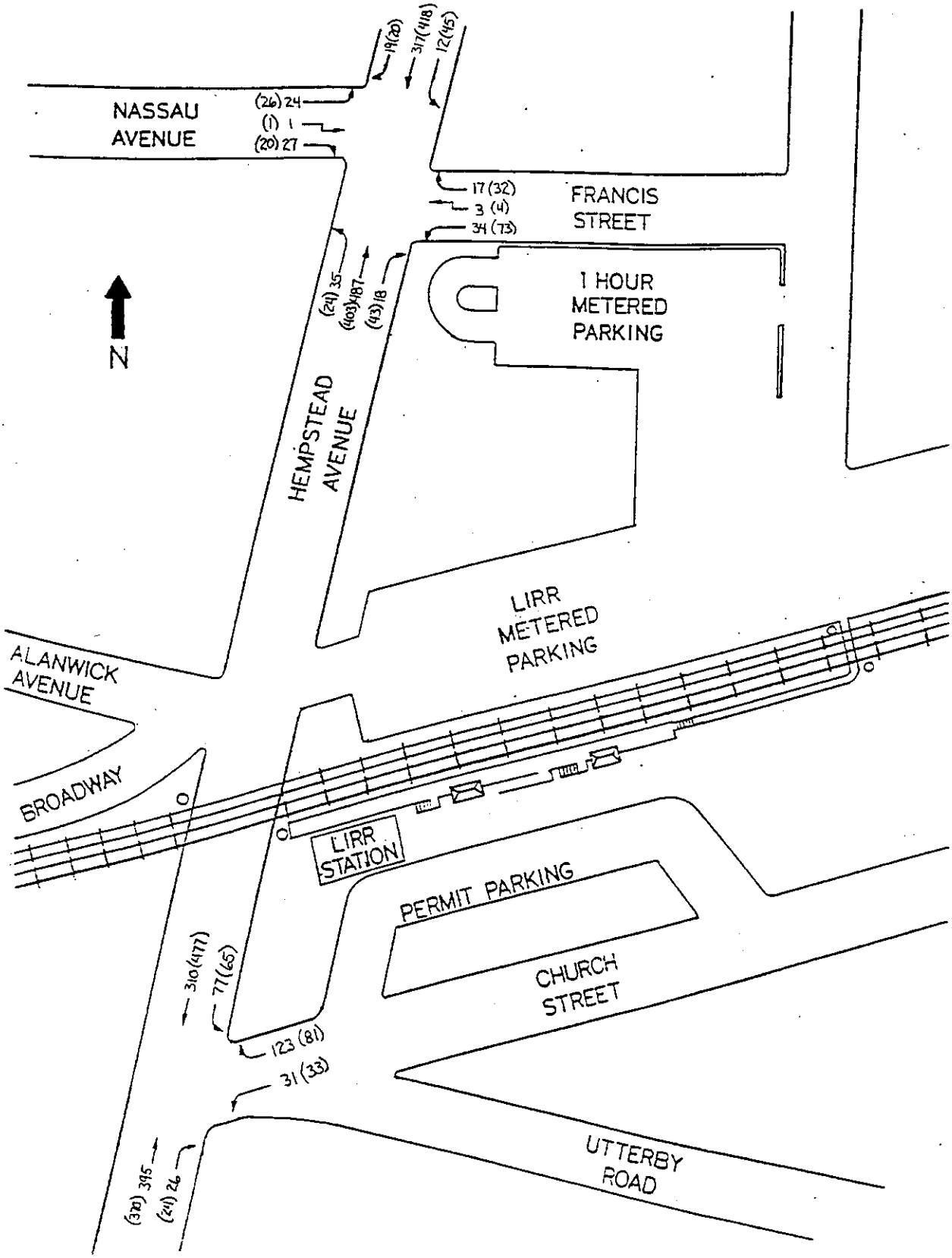


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FIGURE L3
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

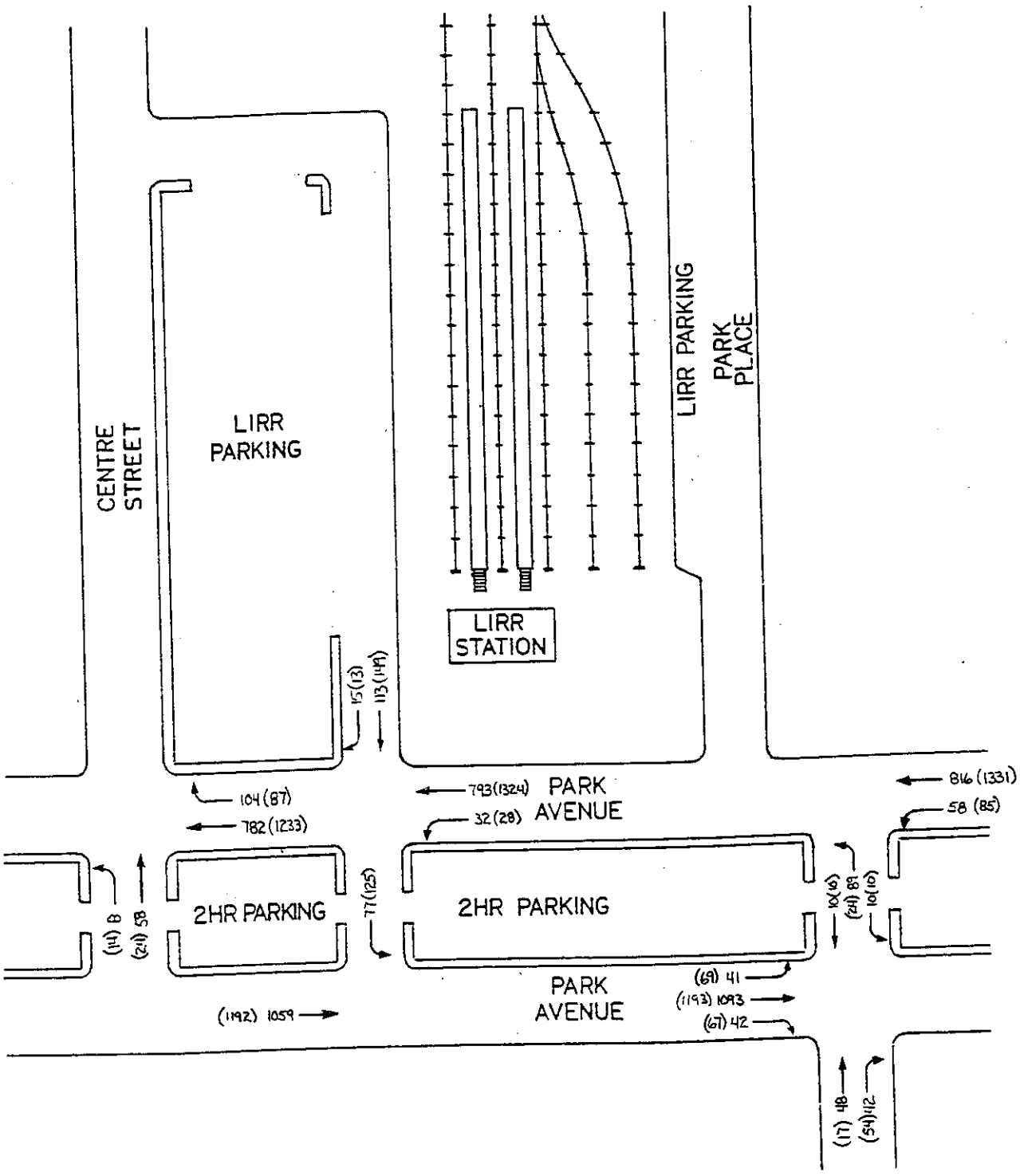
HICKSVILLE LIRR STATION

HICKSVILLE NY 11803



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

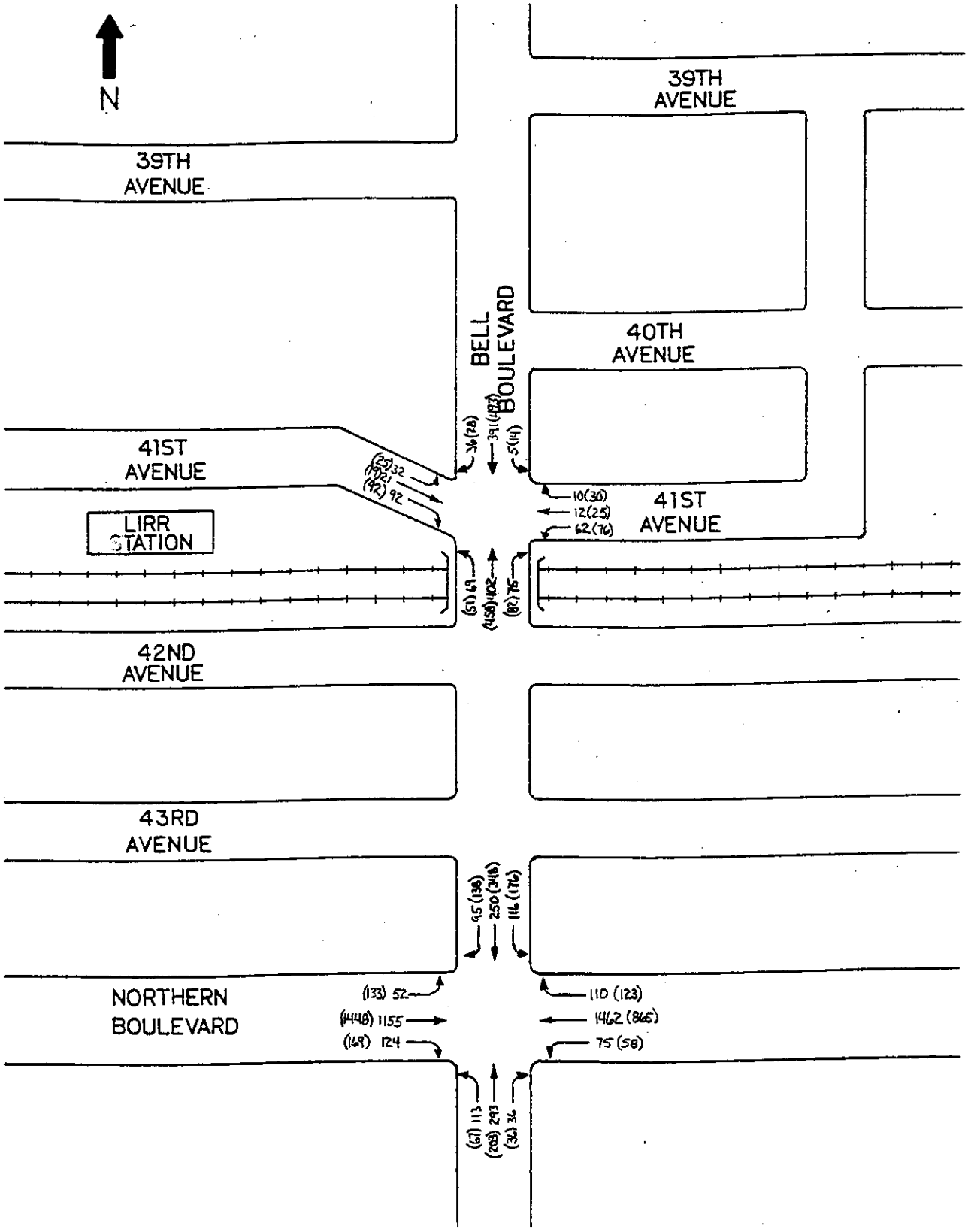
FIGURE L4
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MALVERNE LIRR STATION
MALVERNE NY 11565



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

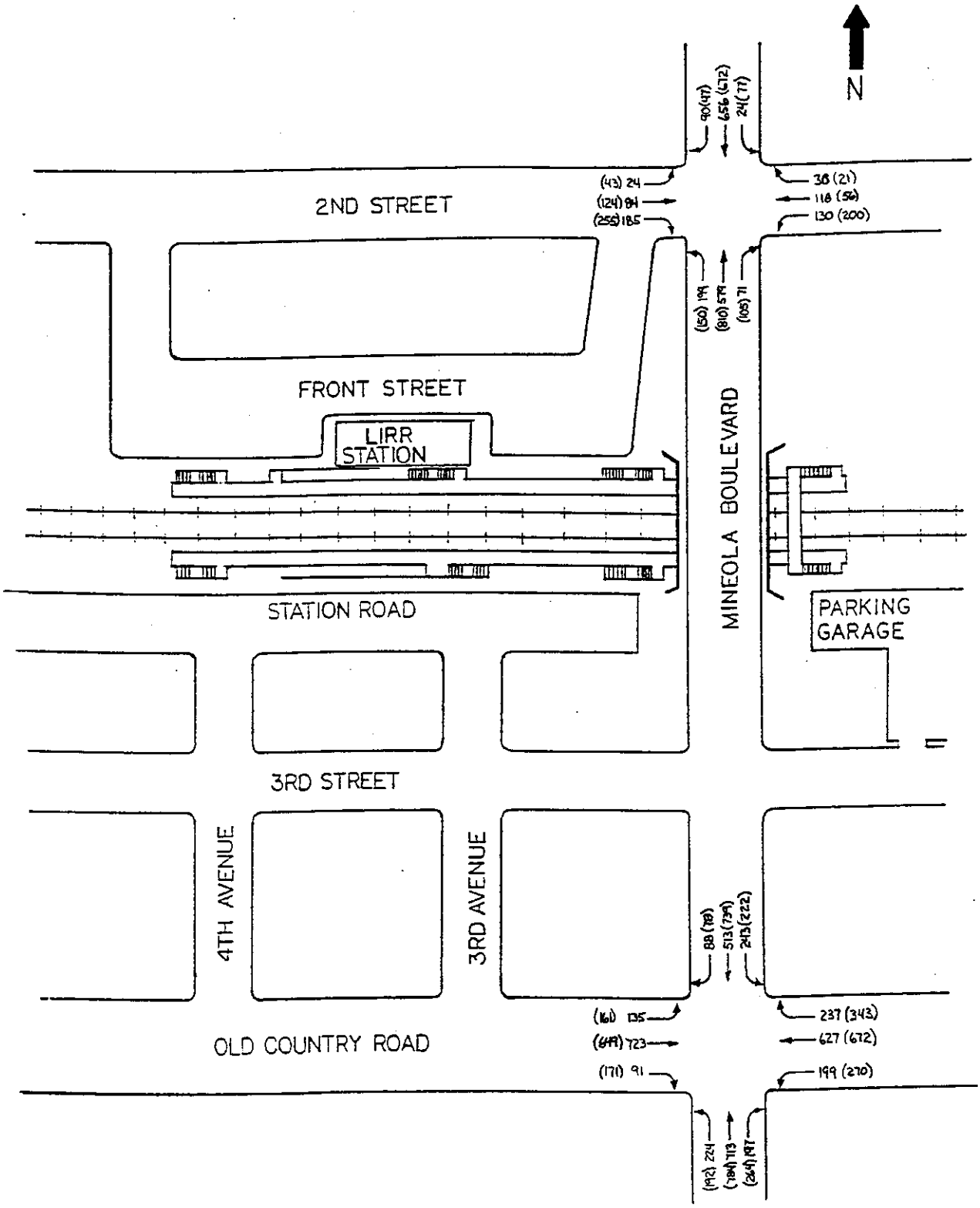
FIGURE L5
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

LONG BEACH LIRR STATION
LONG BEACH NY 11561



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Traffic and Transportation Consultants

FIGURE L6
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BAYSIDE LIRR STATION
BAYSIDE NY 11361

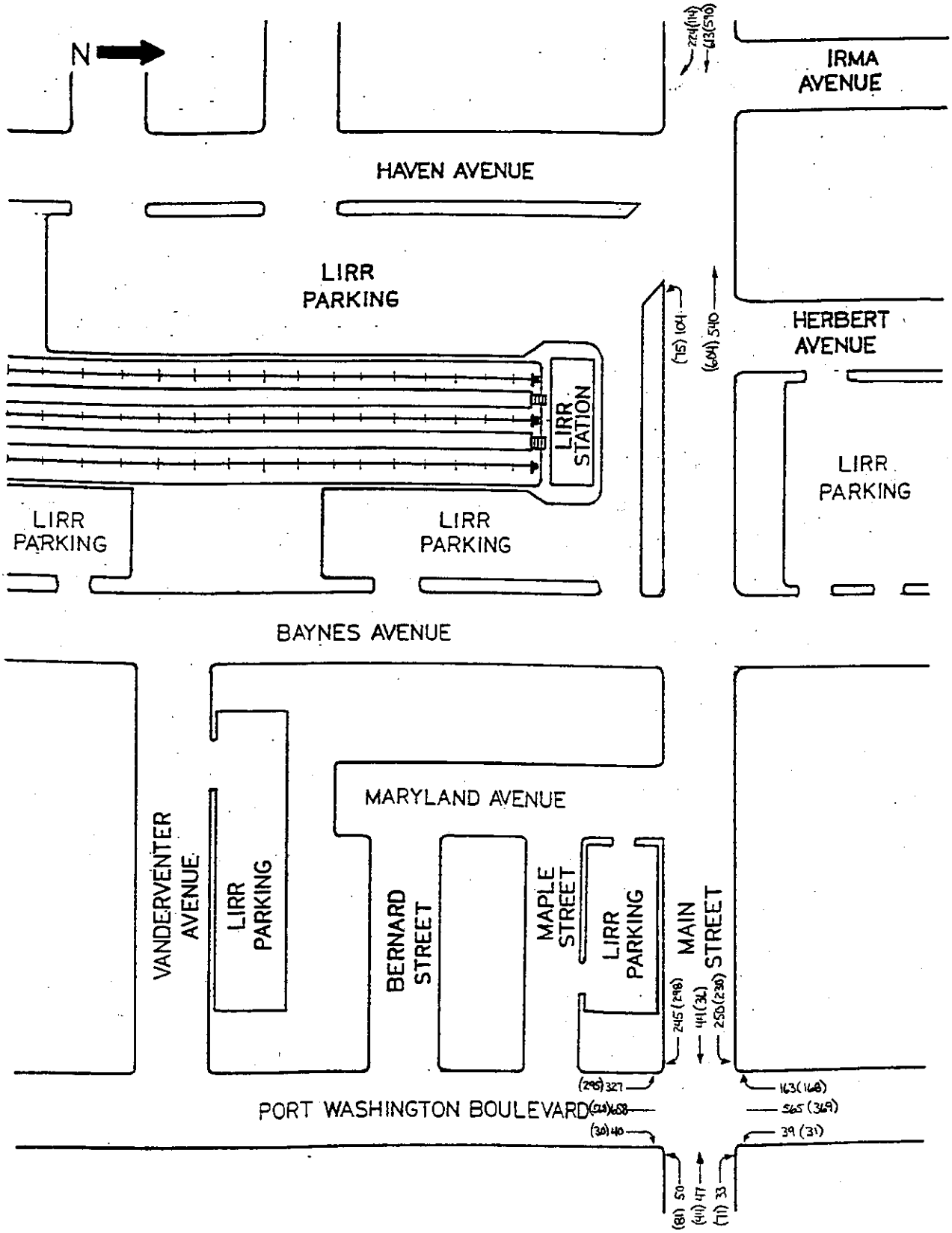


Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE L7
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

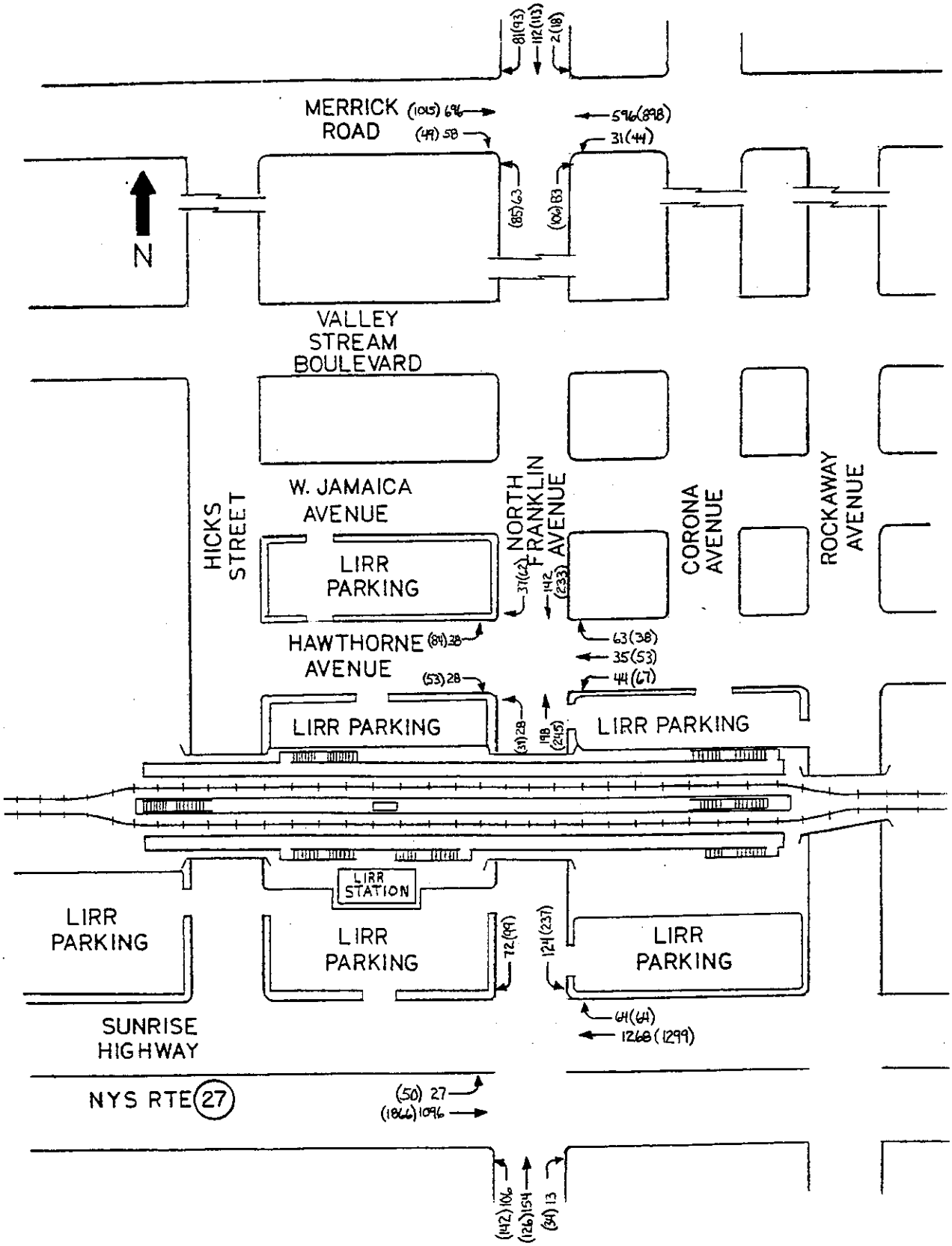
MINEOLA LIRR STATION
MINEOLA NY 11501



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L8
EXISTING LIRR TRAFFIC VOLUMES:
AM AND(PM)PEAK HOURS

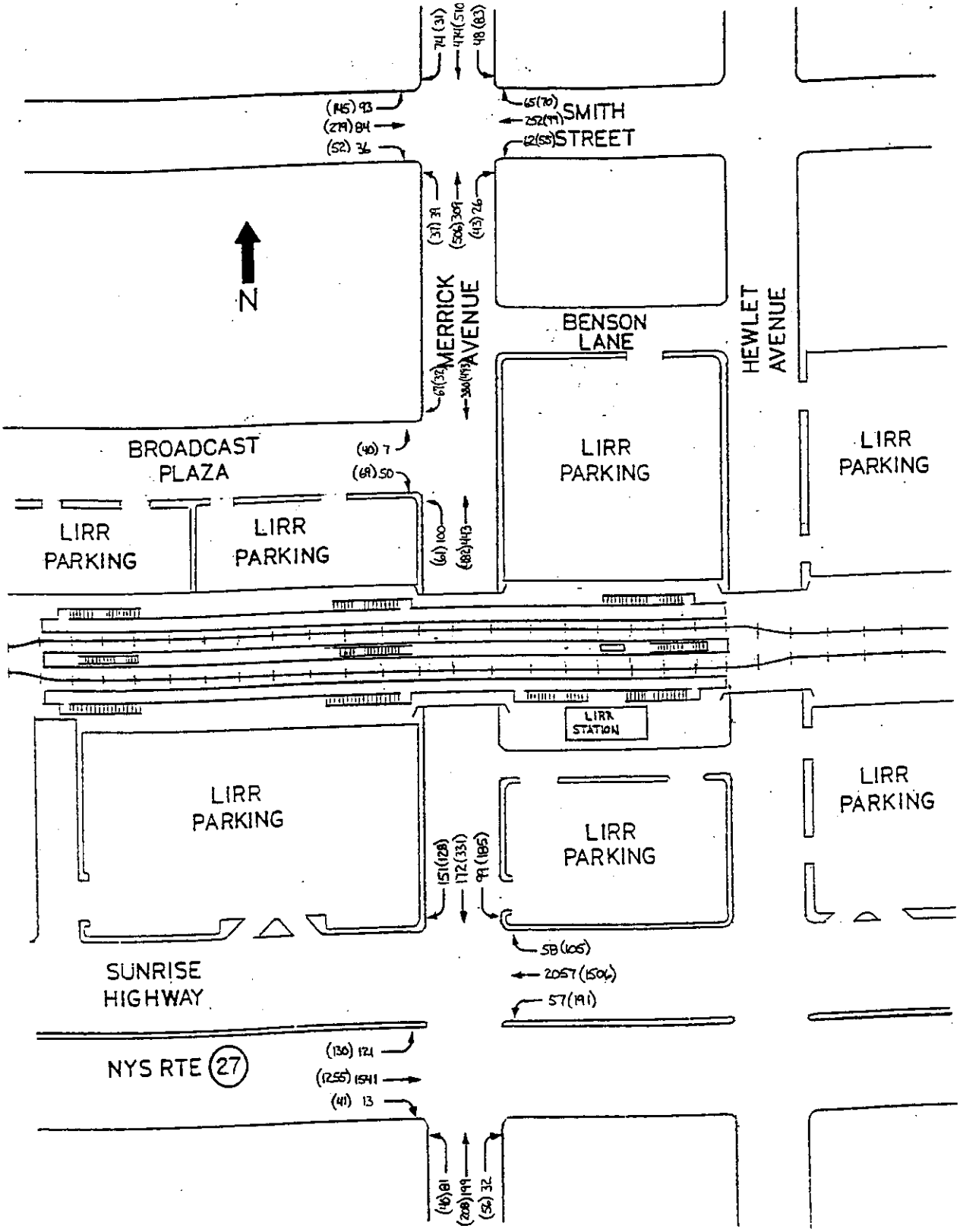
PORT WASHINGTON LIRR STATION
PORT WASHINGTON NY 11050



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

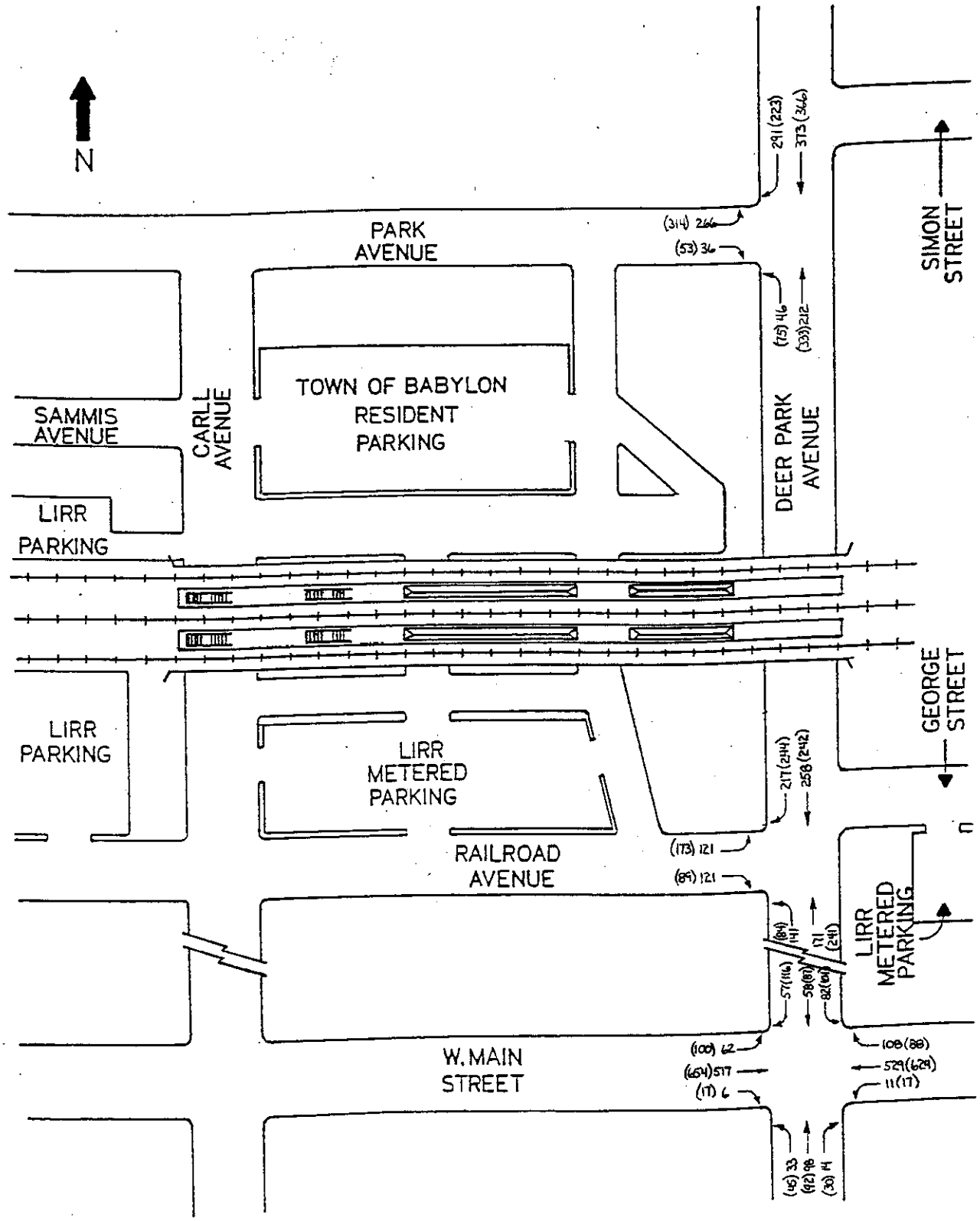
FIGURE L9
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

VALLEY STREAM LIRR STATION
VALLEY STREAM NY 11580



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

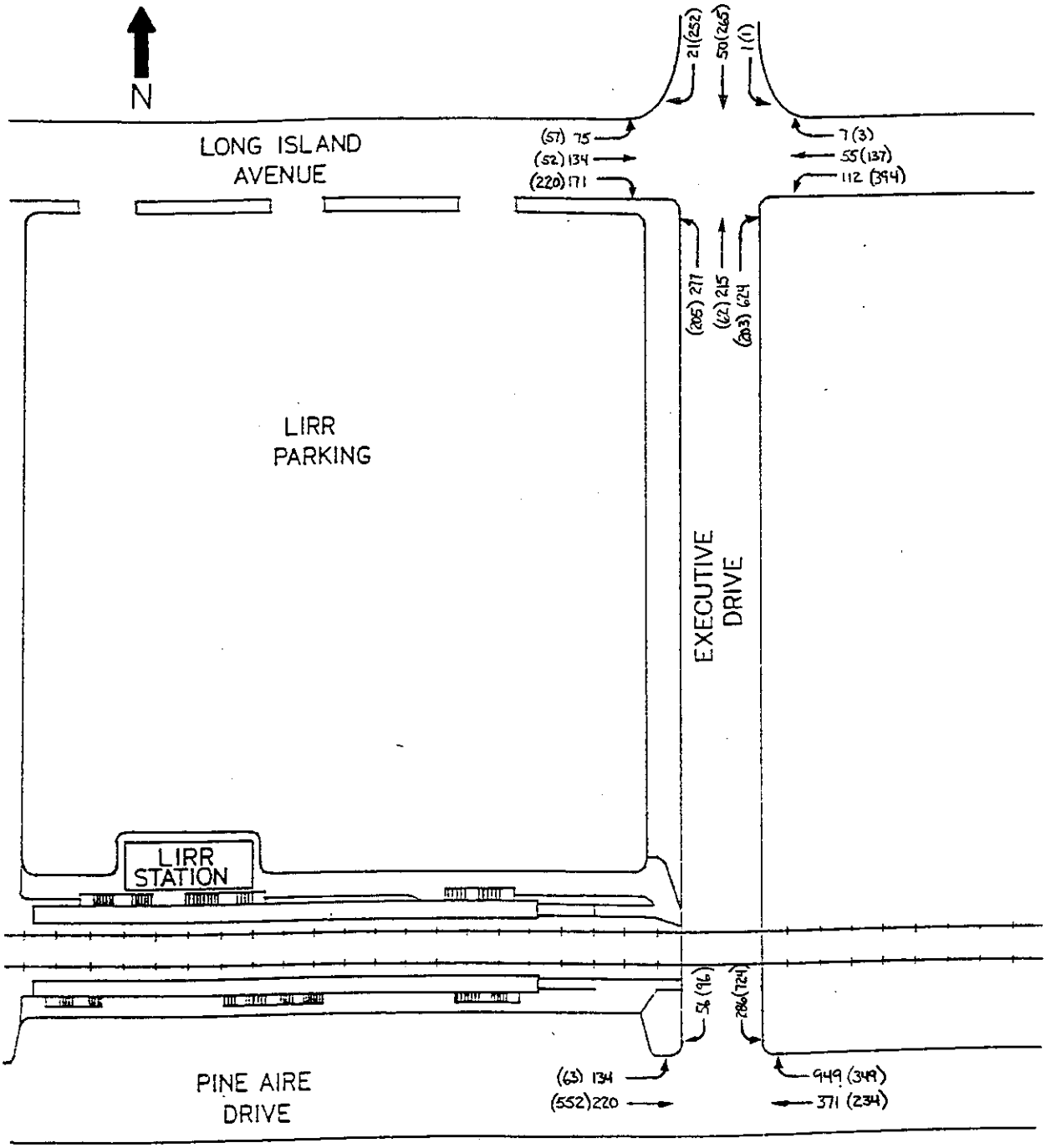
FIGURE L10
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MERRICK LIRR STATION
MERRICK NY 11566



Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

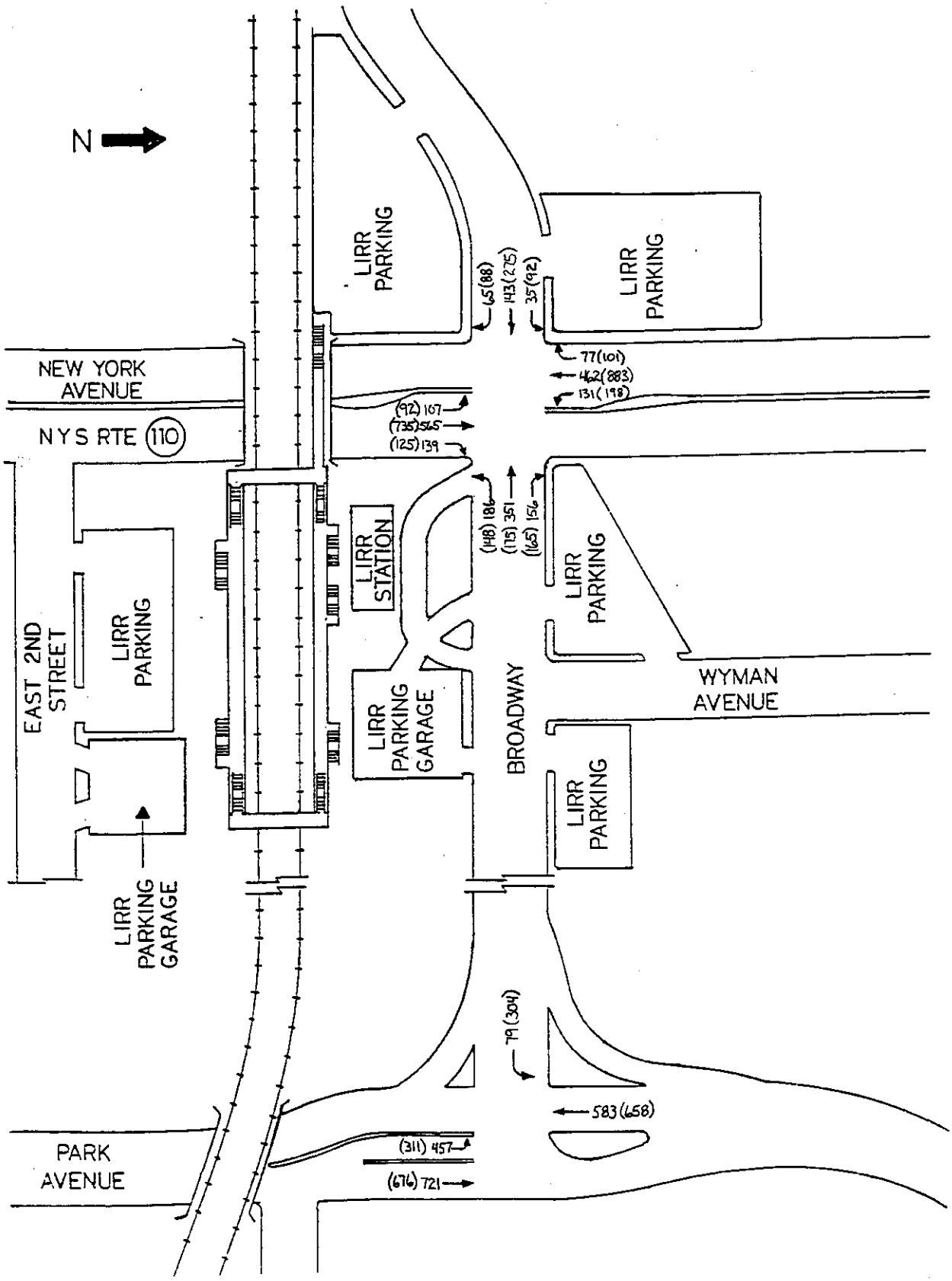
FIGURE L11
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BABYLON LIRR STATION
BABYLON NY 11702



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L12
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

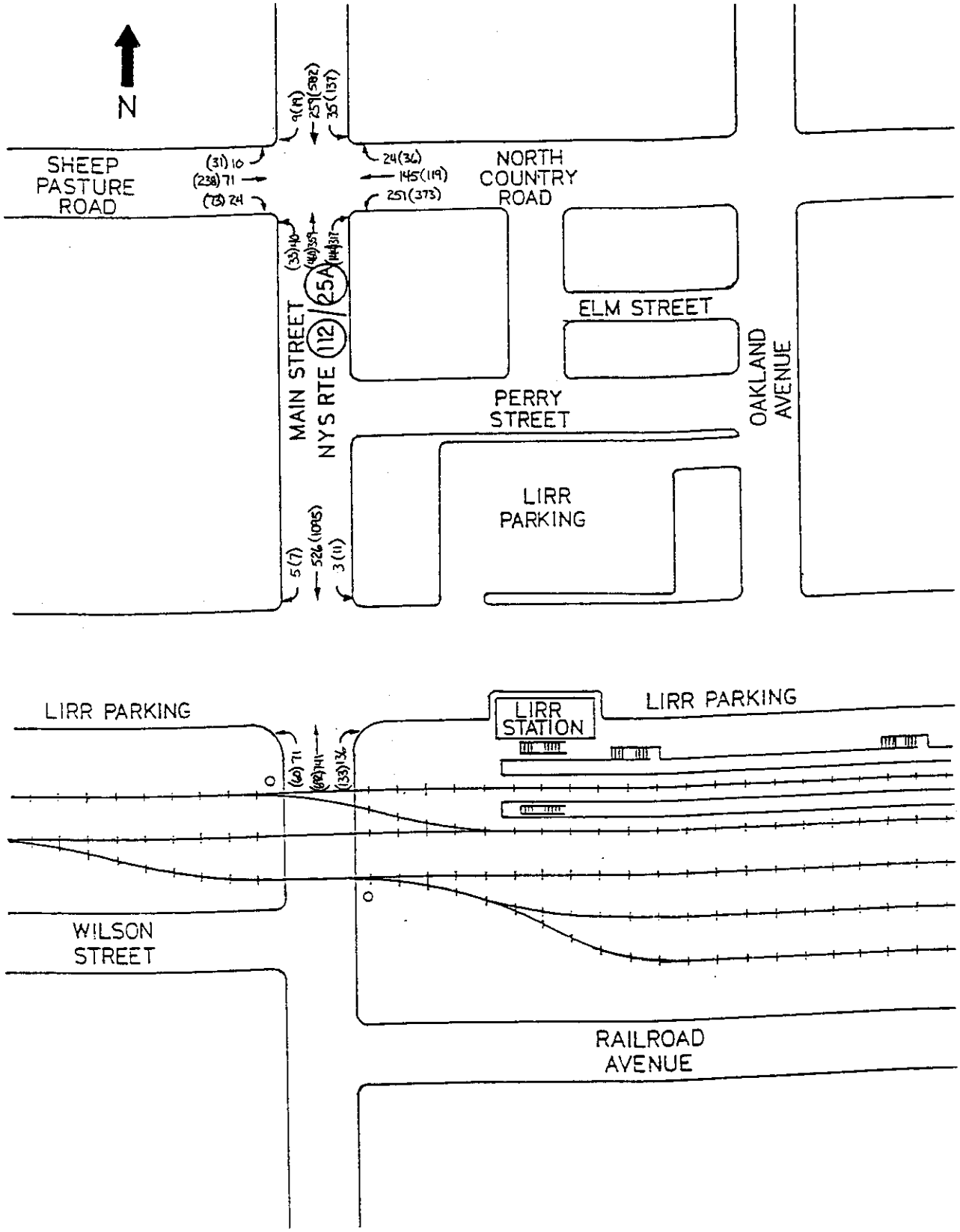
DEER PARK LIRR STATION
EDGEWOOD NY 11717



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

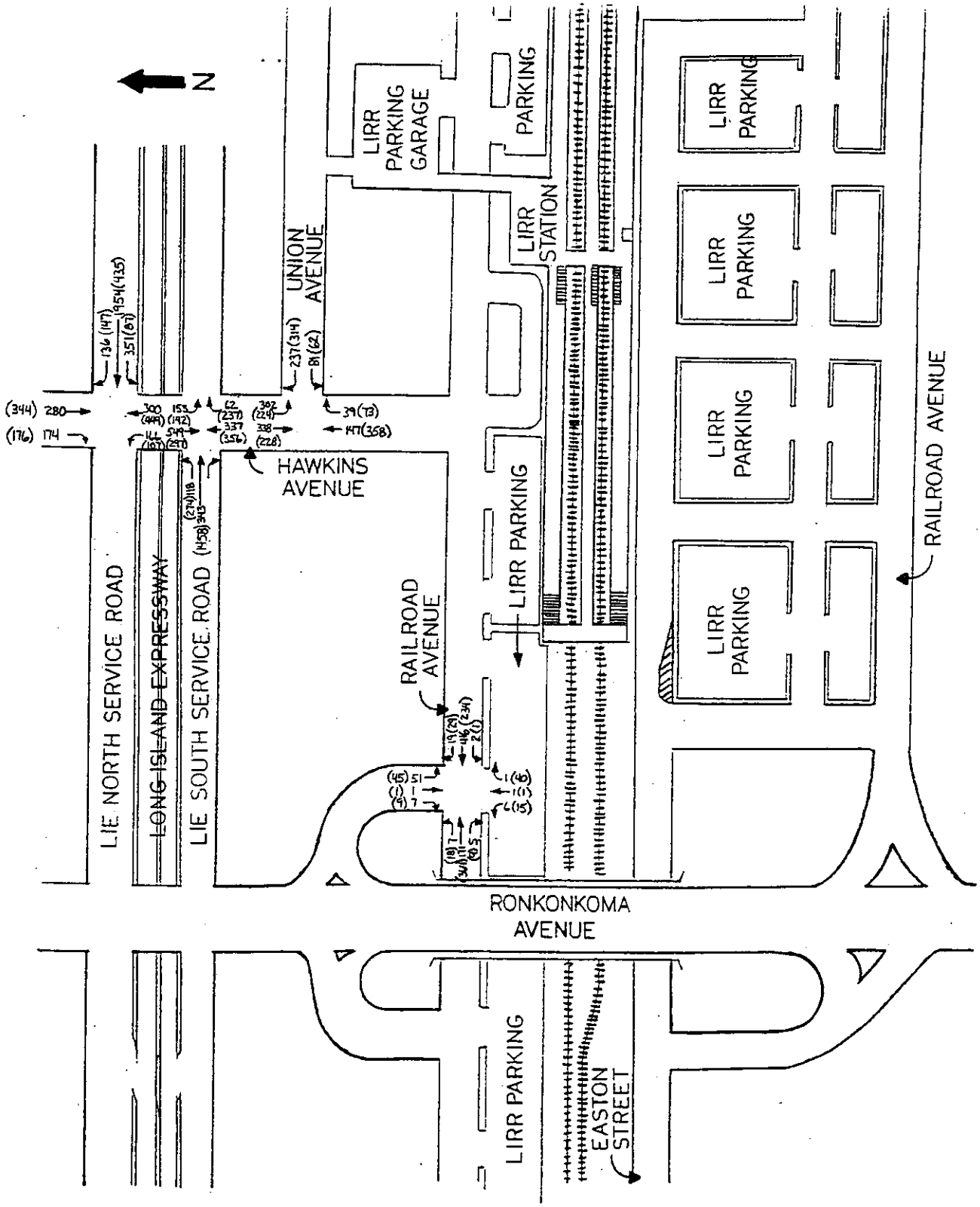
FIGURE L13
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HUNTINGTON LIRR STATION
HUNTINGTON MANOR NY 11746



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L14
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
PORT JEFFERSON LIRR STATION
PORT JEFFERSON STATION NY 11776



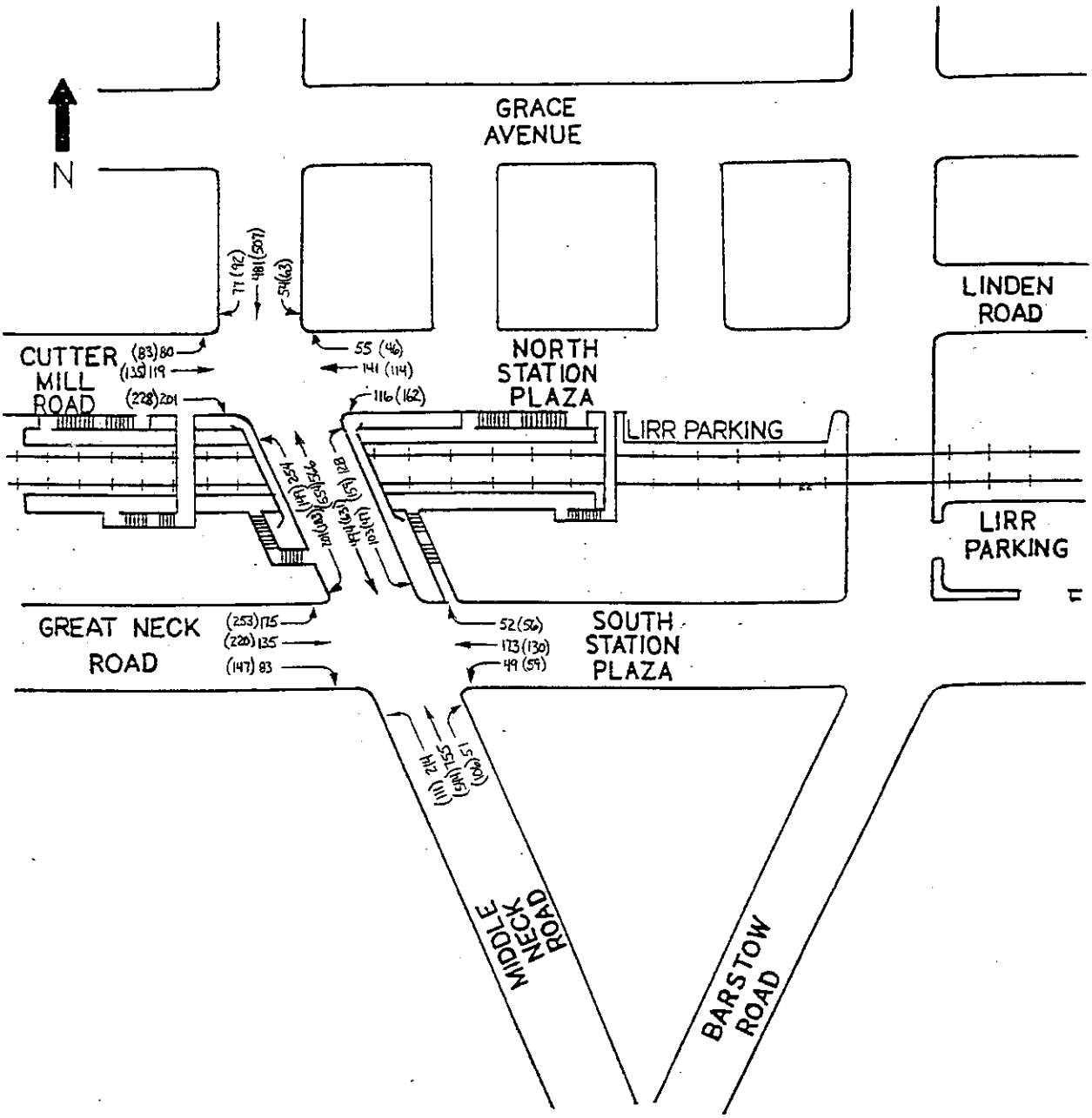
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L15
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

RONKONKOMA LIRR STATION
RONKONKOMA NY 11779

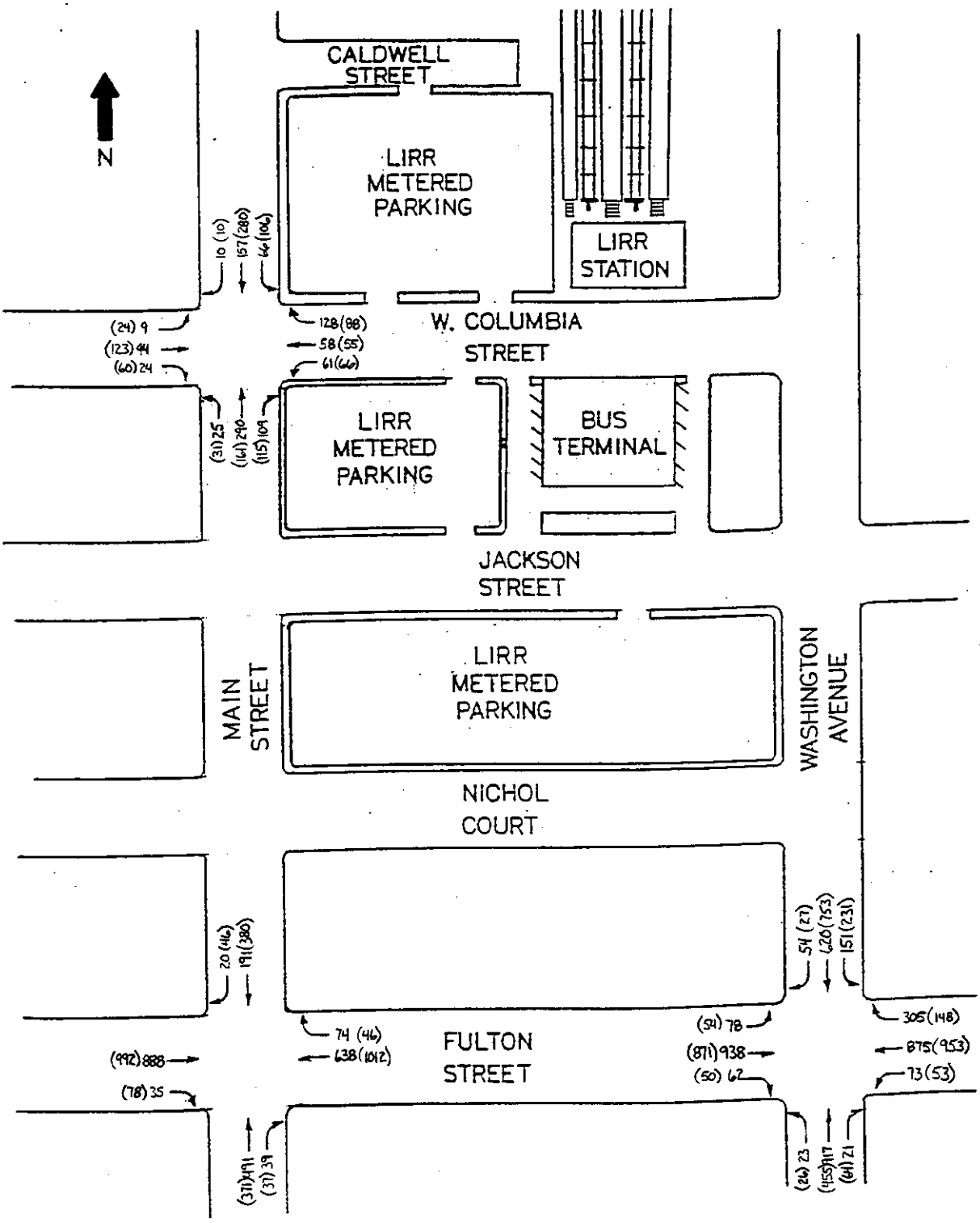
FIGURES L - 16 to L - 30

NO BUILD LONG ISLAND RAIL ROAD STATION AREA TRAFFIC VOLUMES



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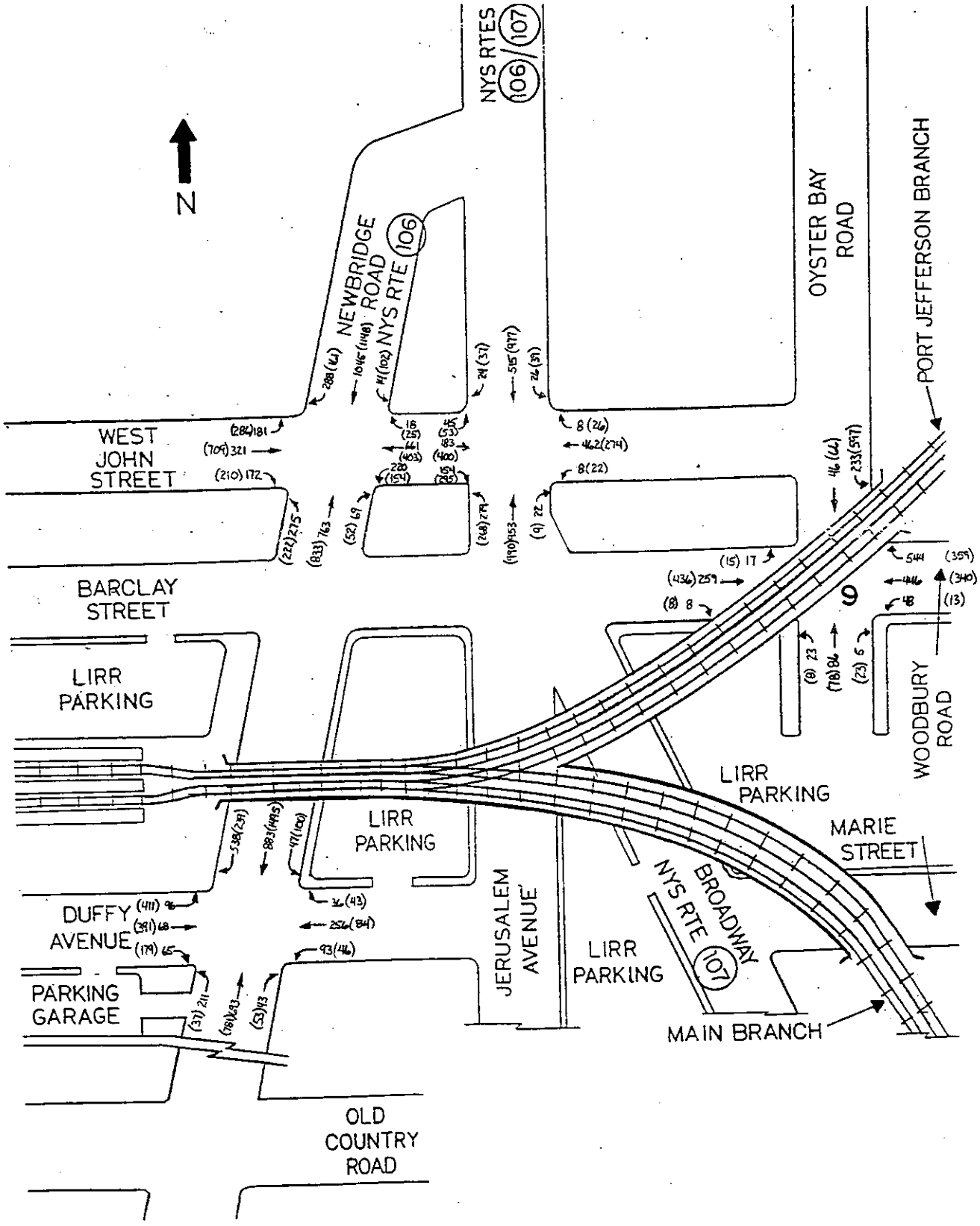
FIGURE L16
NO BUILD LIRR TRAFFIC VOLUMES
AM AND PM PEAK HOURS
GREAT NECK LIRR STATION
GREAT NECK NY 11021



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L17
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND(PM)PEAK HOURS

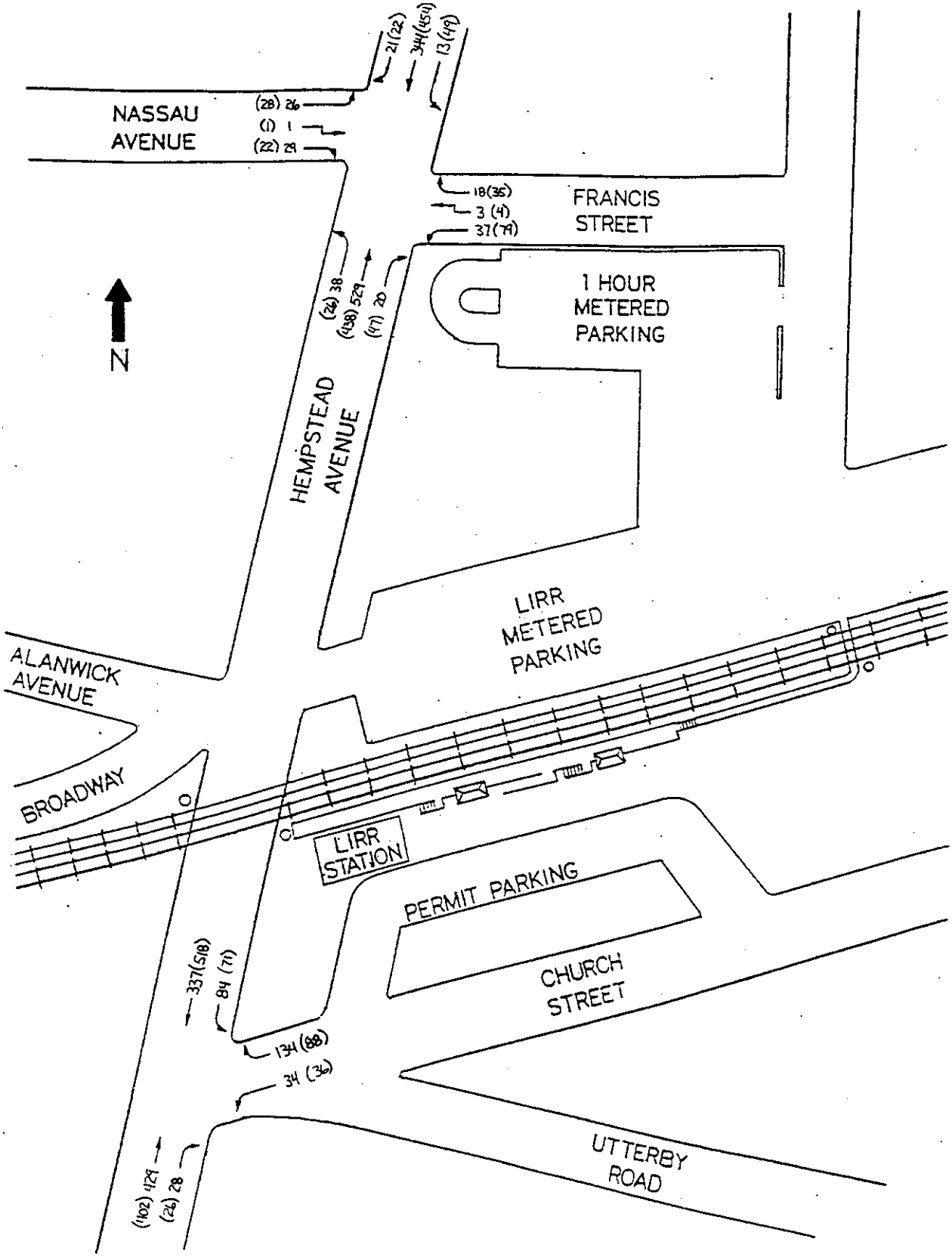
HEMPSTEAD LIRR STATION
HEMPSTEAD NY 11550



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

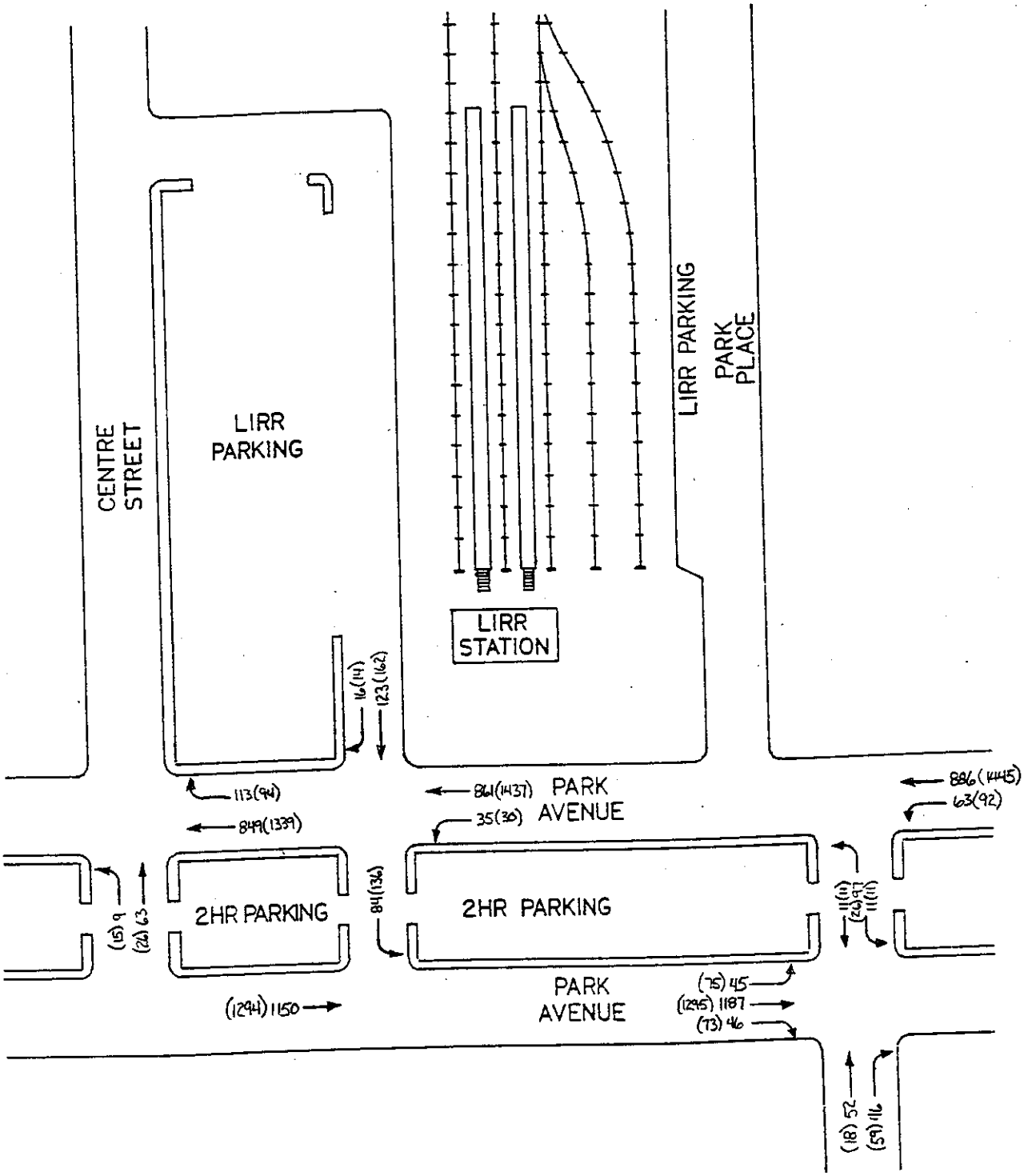
FIGURE L18
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HICKSVILLE LIRR STATION
HICKSVILLE NY 11803



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

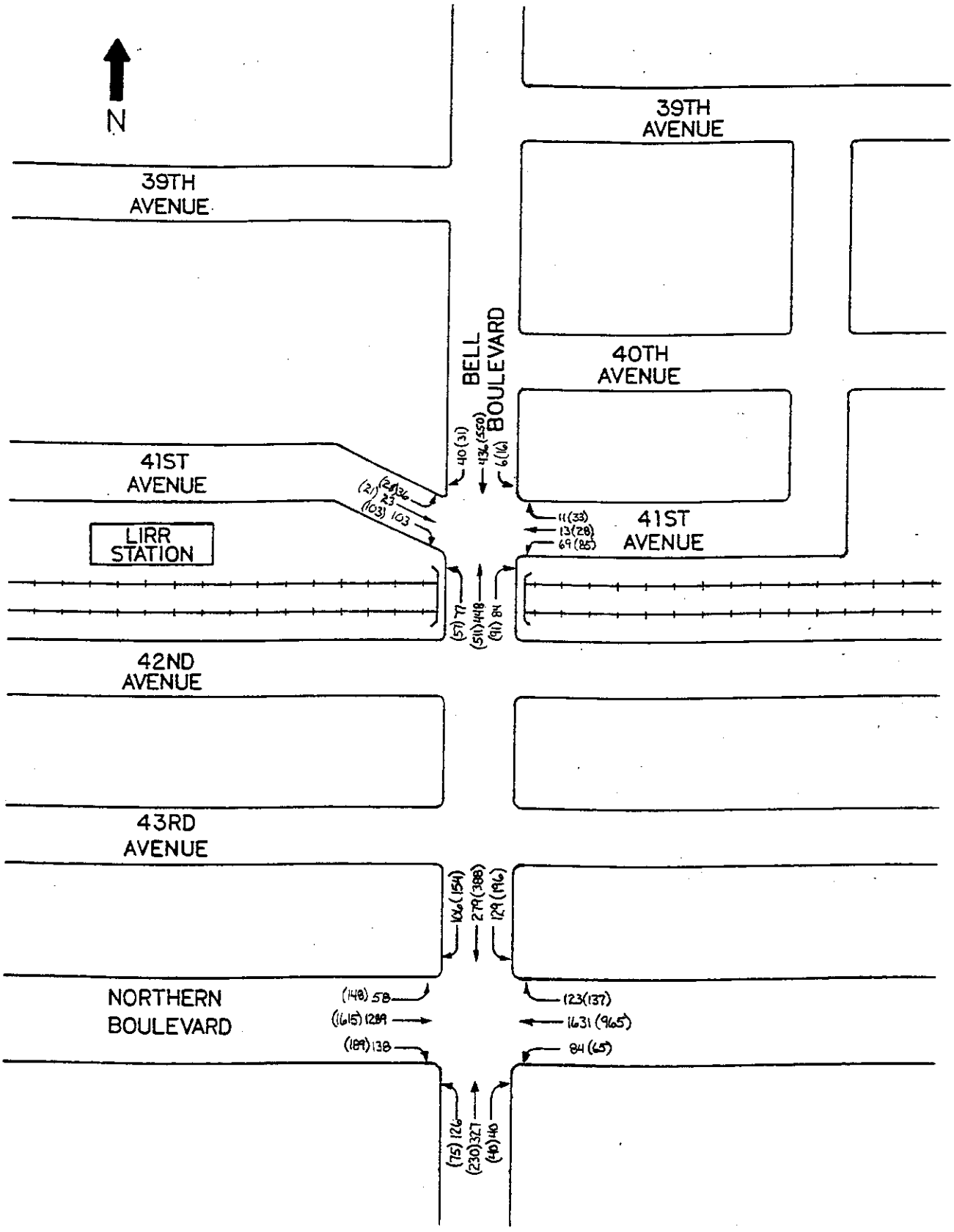
FIGURE L19
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MALVERNE LIRR STATION
MALVERNE NY 11565



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

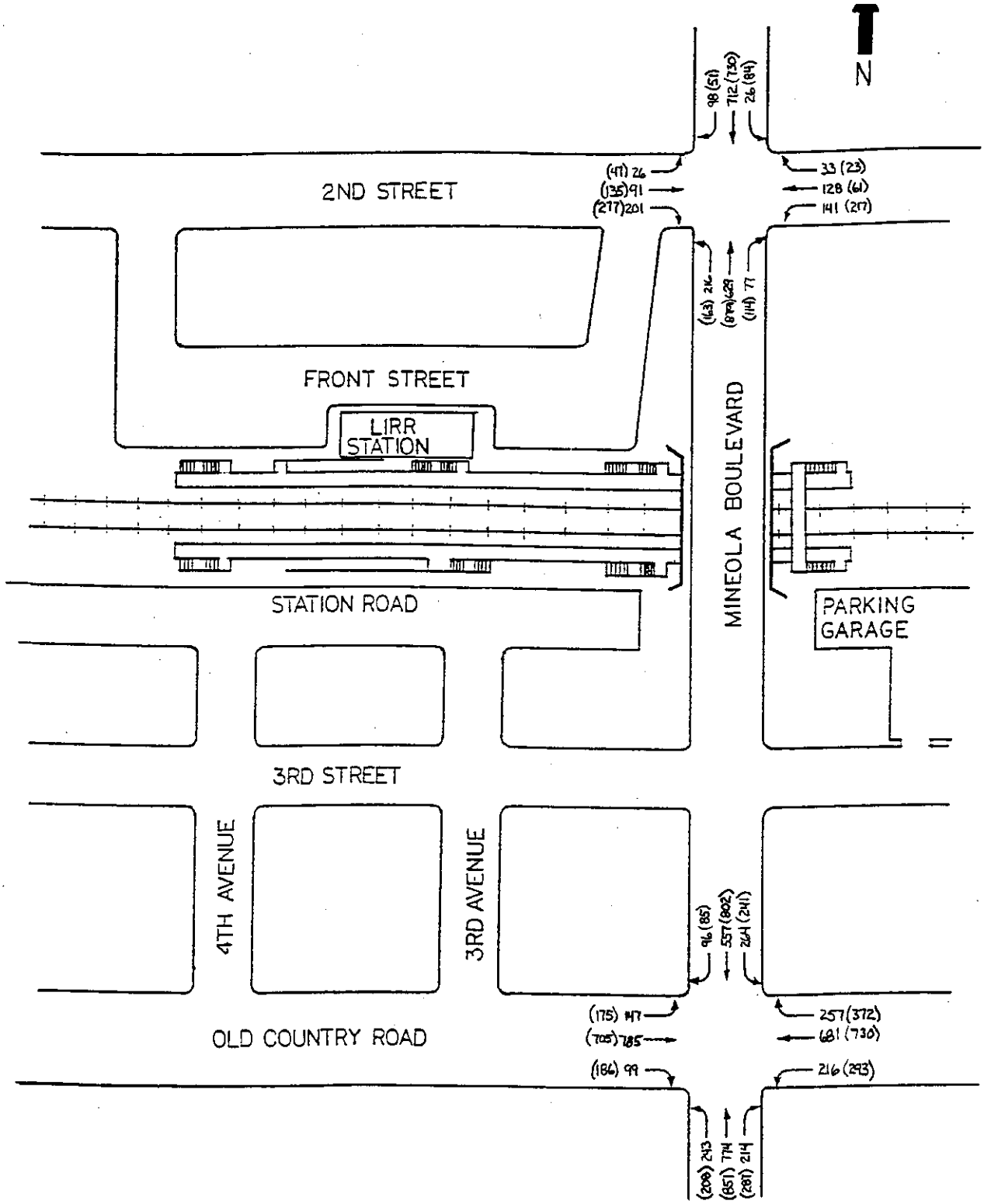
FIGURE L20
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

LONG BEACH LIRR STATION
LONG BEACH NY 11561



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

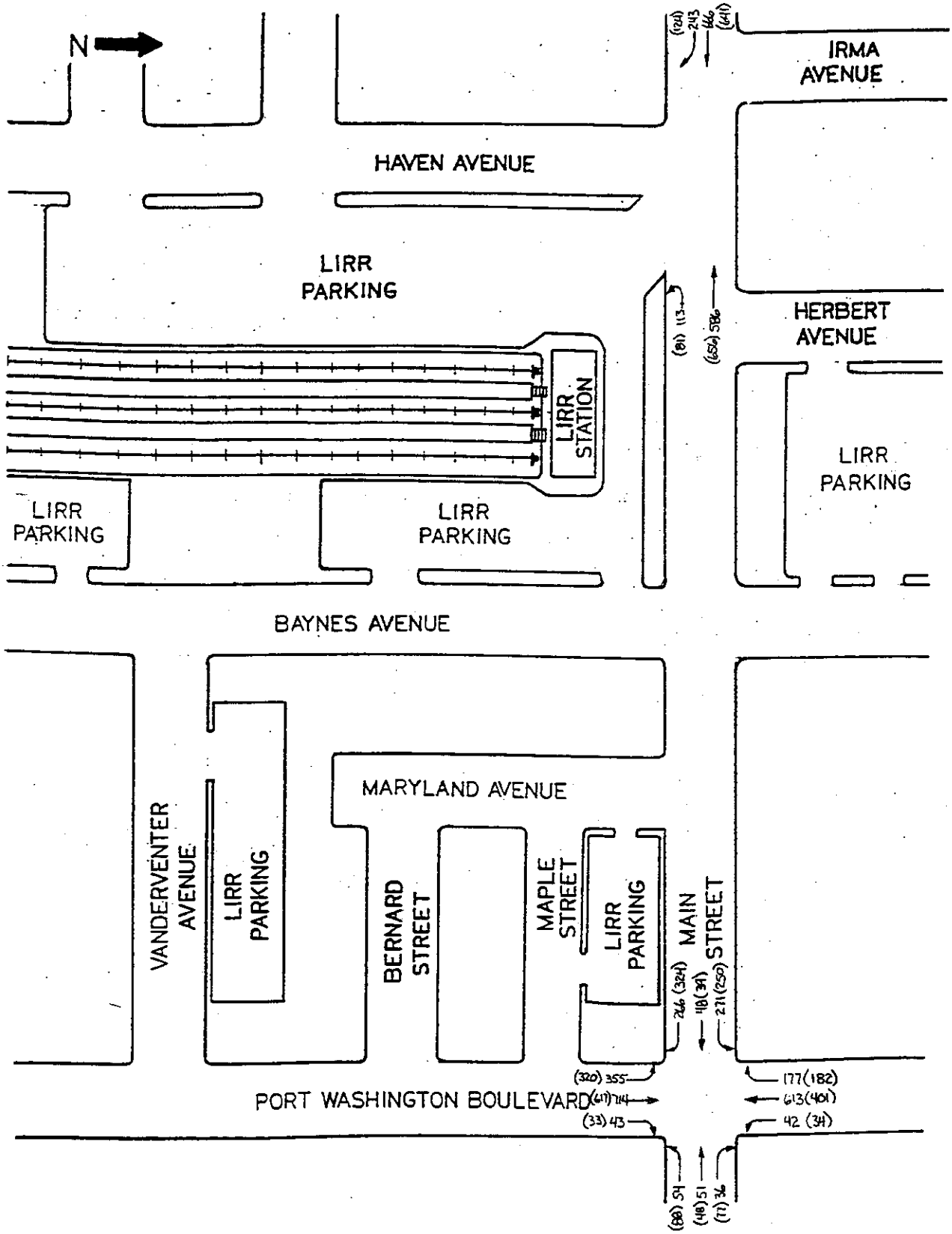
FIGURE L21
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BAYSIDE LIRR STATION
BAYSIDE NY 11361



Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

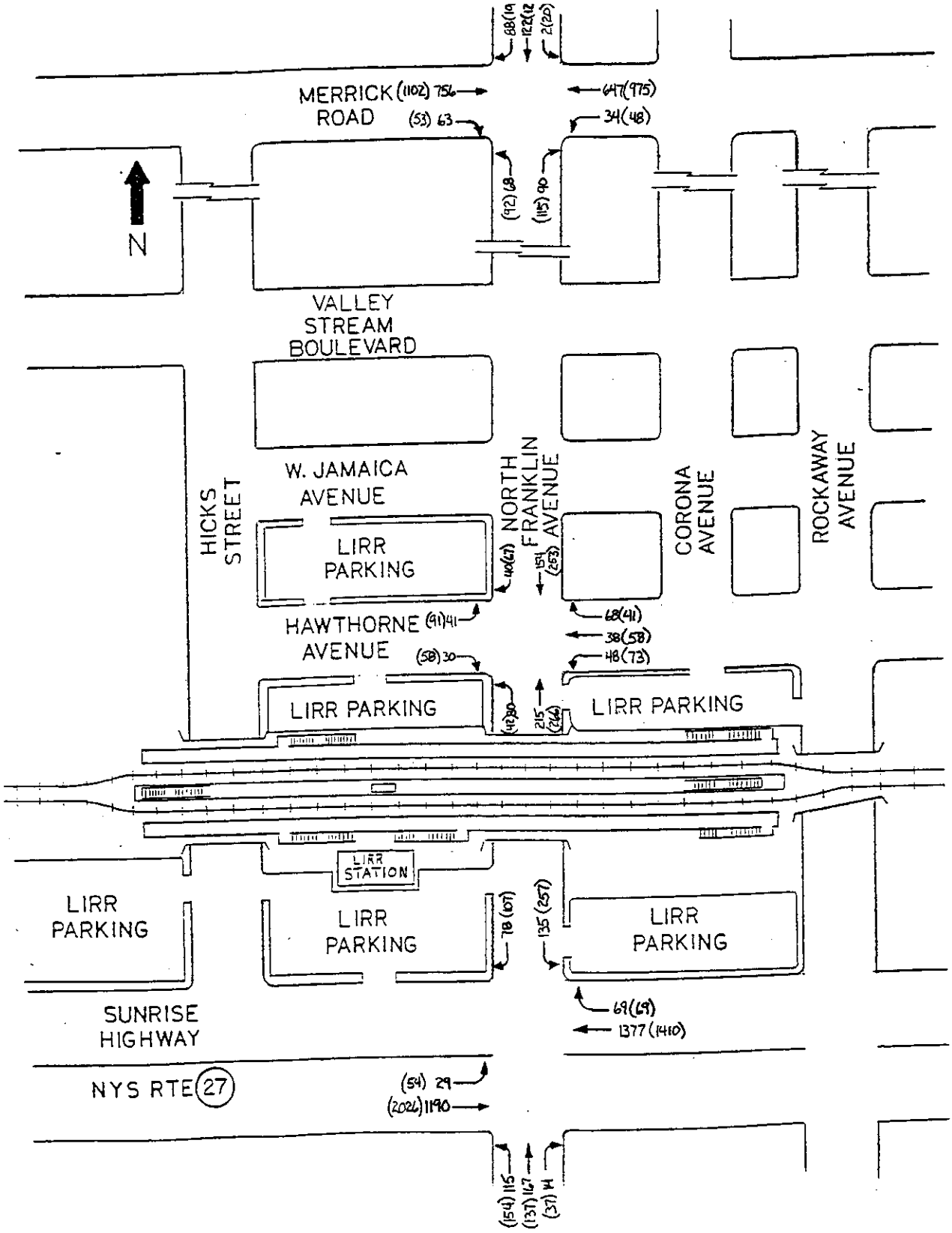
FIGURE L22
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MINEOLA LIRR STATION
MINEOLA NY 11501



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L23
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

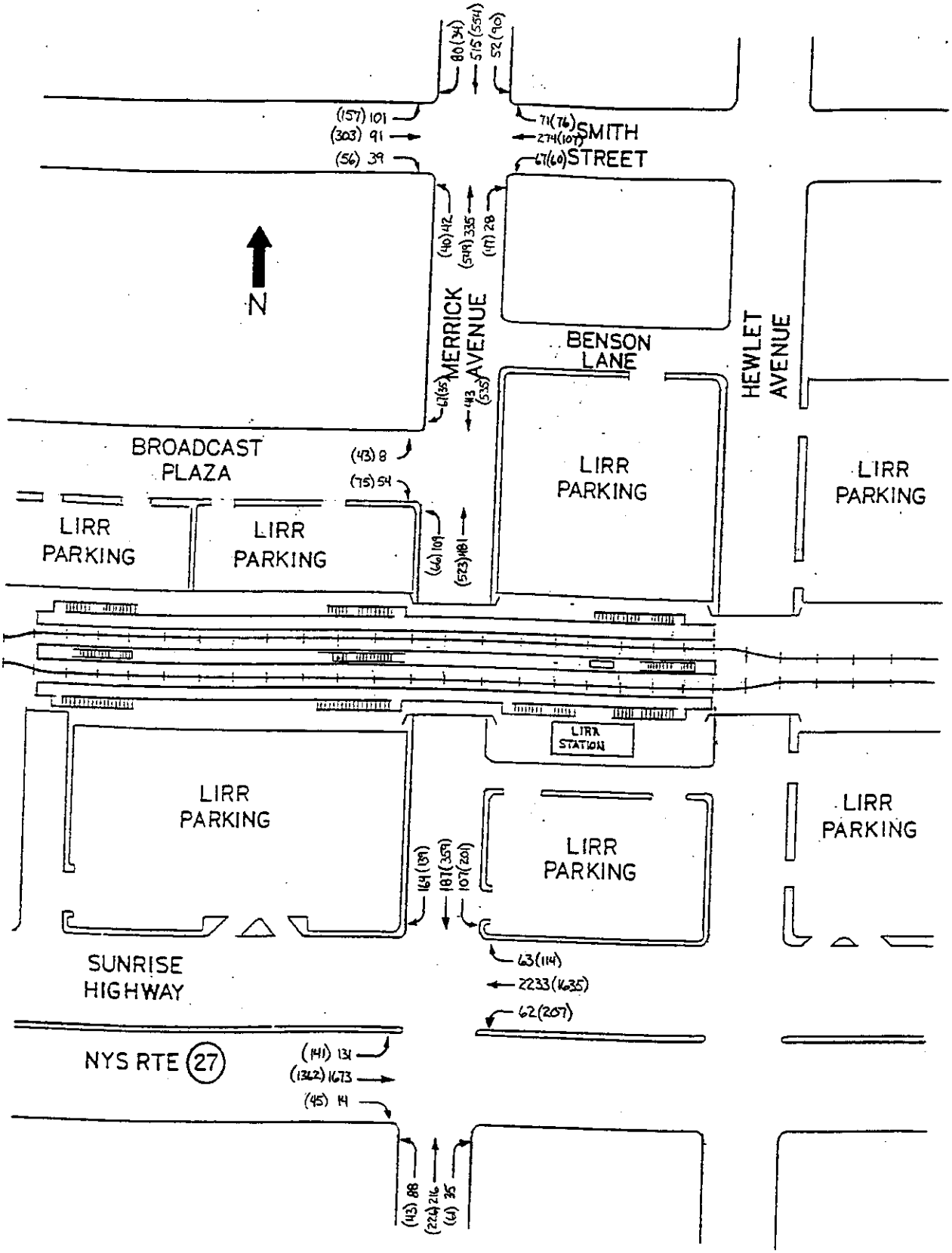
PORT WASHINGTON LIRR STATION
PORT WASHINGTON NY 11050



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

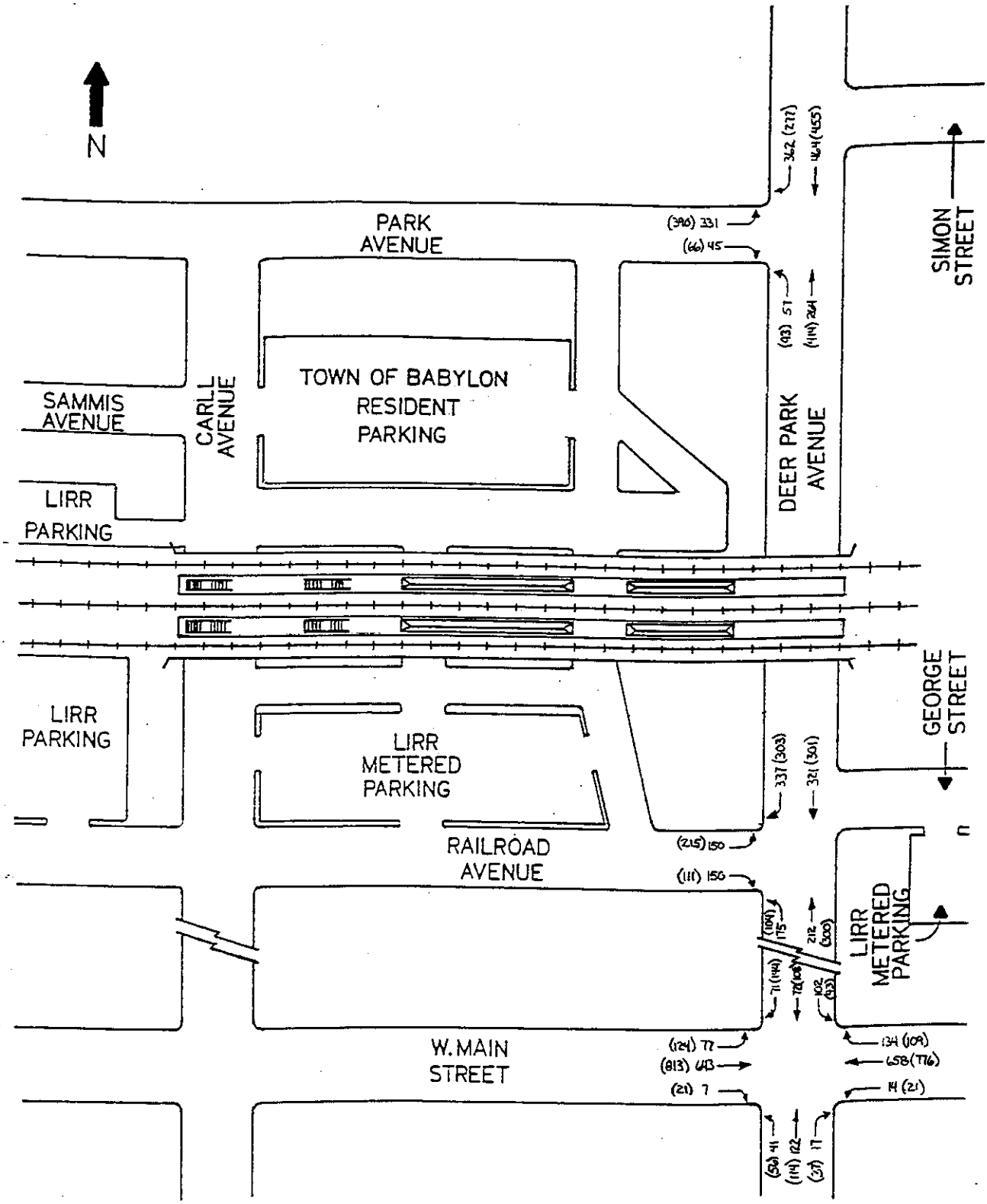
FIGURE L24
NO BUILD LIRR TRAFFIC VOLUMES: AM AND (PM) PEAK HOURS

VALLEY STREAM LIRR STATION
VALLEY STREAM NY 11580



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

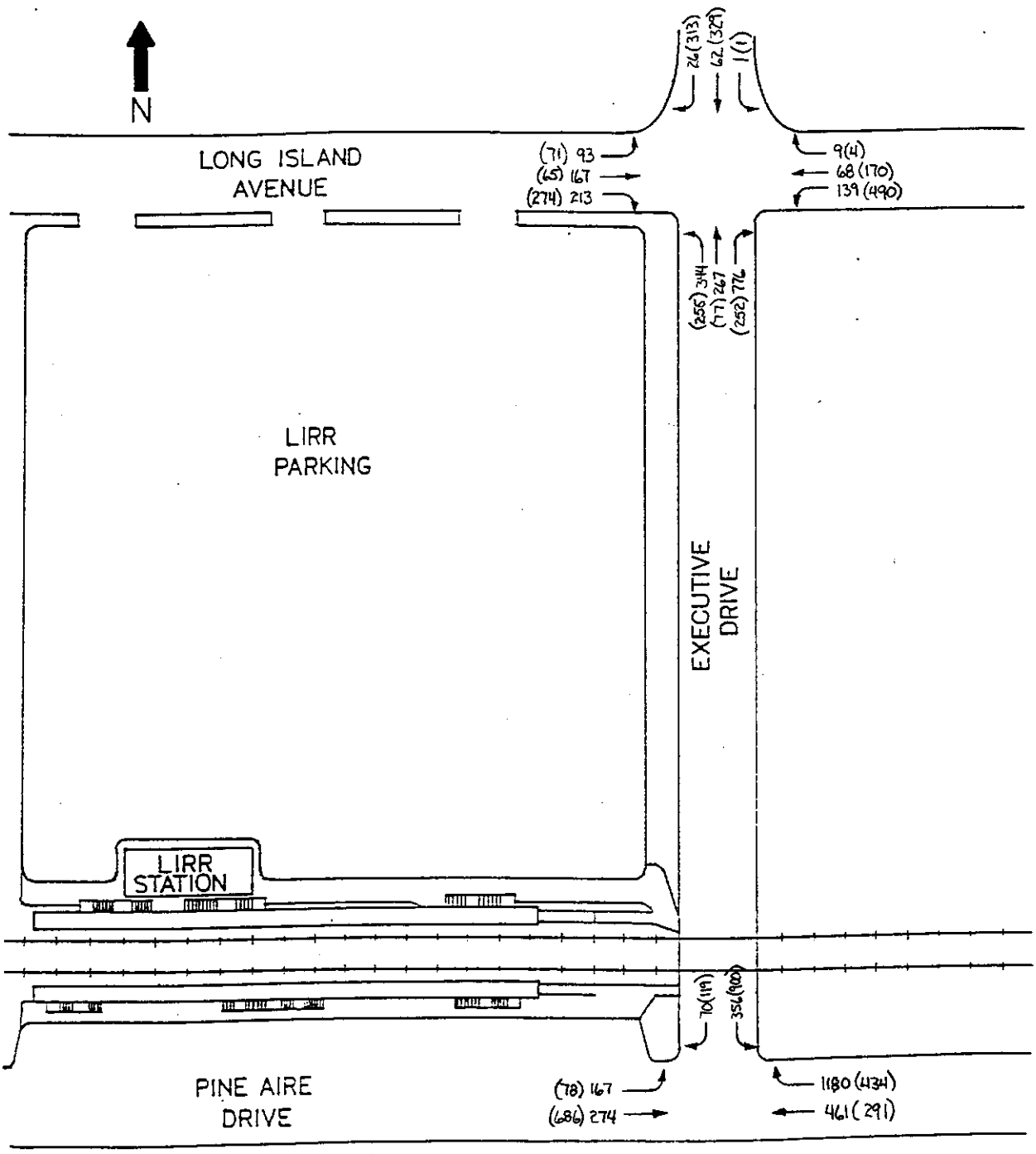
FIGURE L25
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MERRICK LIRR STATION
MERRICK NY 11566



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L26
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

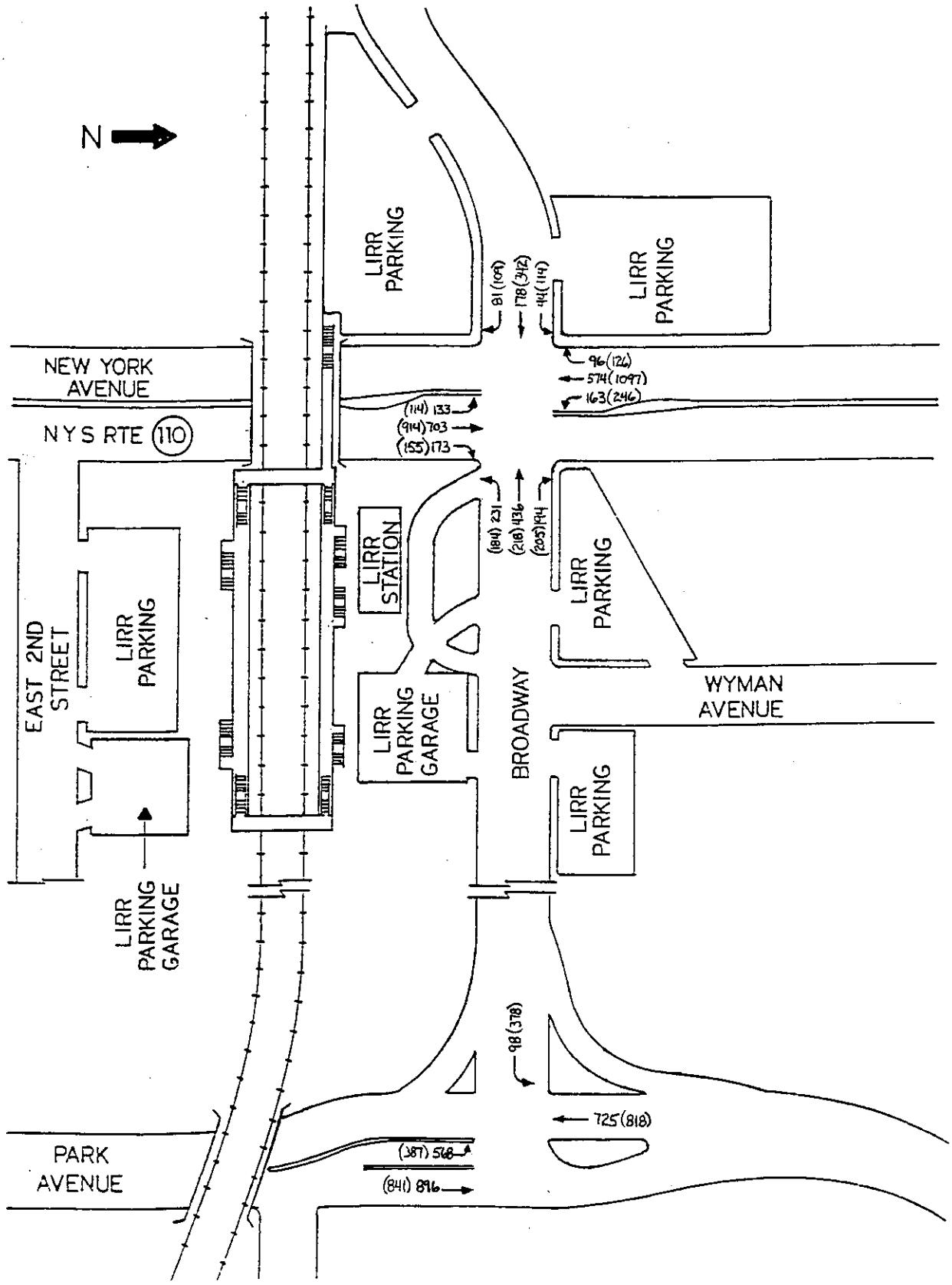
BABYLON LIRR STATION
BABYLON NY 11702



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L27
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

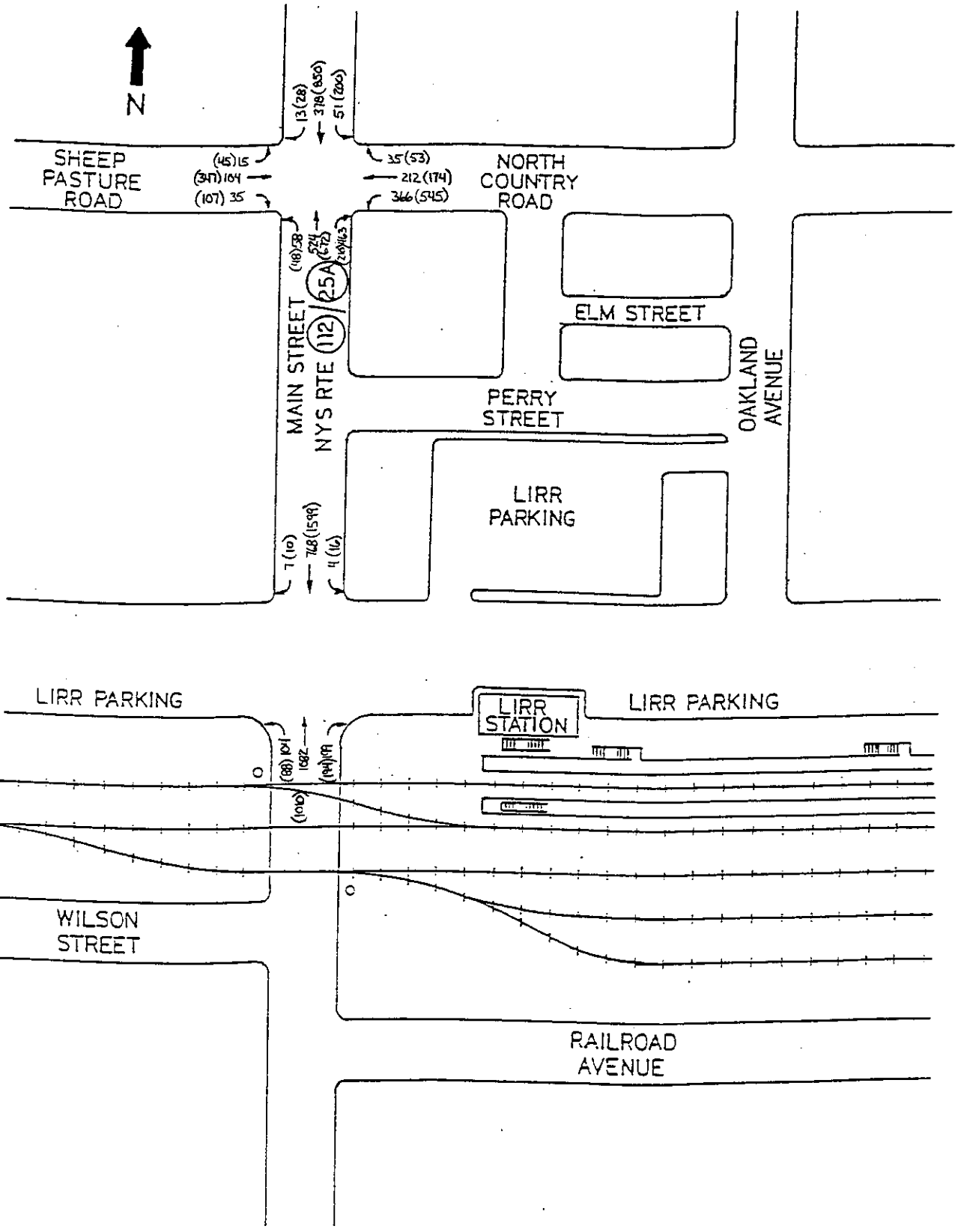
DEER PARK LIRR STATION
EDGEWOOD NY 11717



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Traffic and Transportation Consultants

FIGURE L28
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HUNTINGTON LIRR STATION
HUNTINGTON MANOR NY 11746

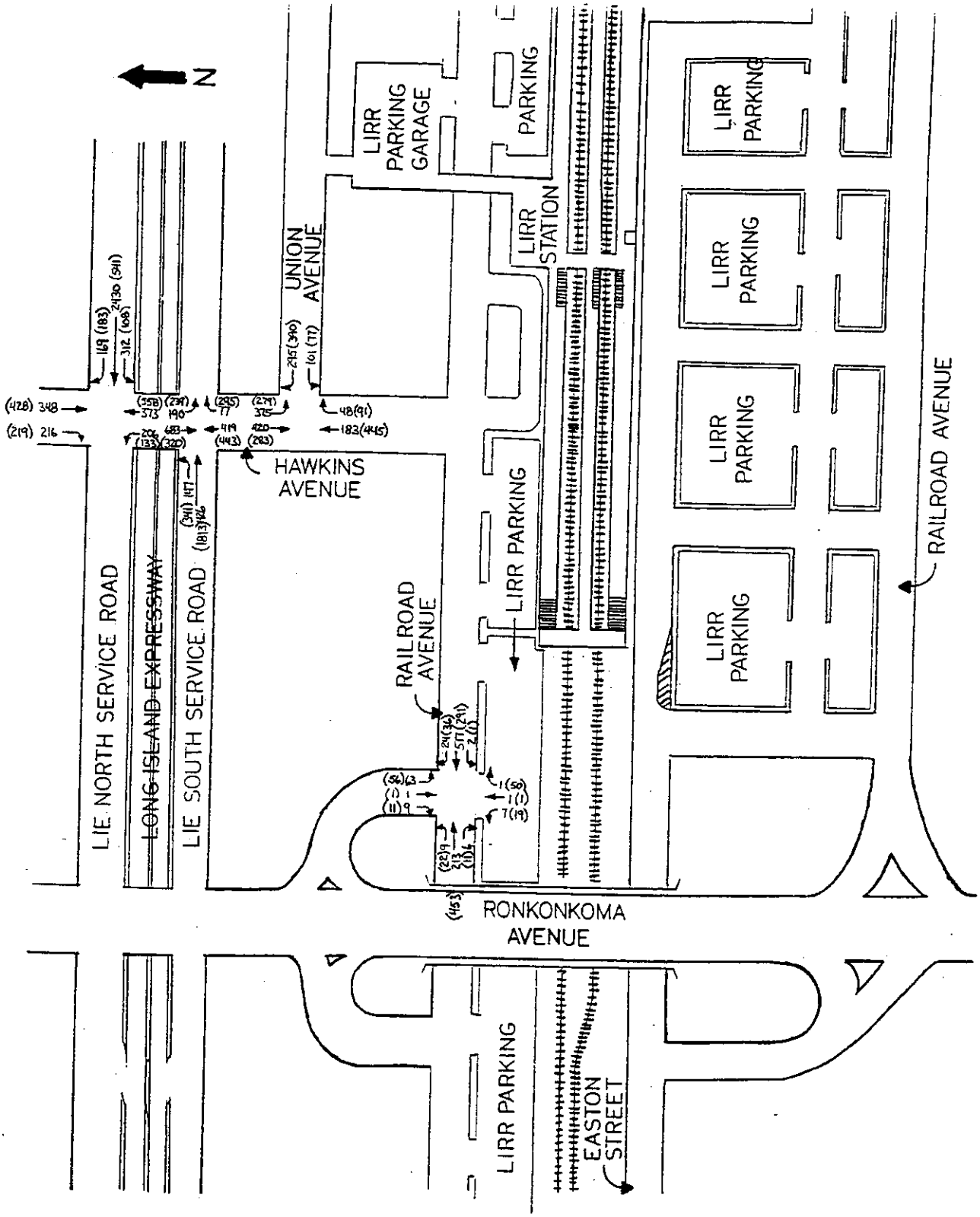


Eng-Wong, Taub & Associates

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FIGURE L29

NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
PORT JEFFERSON LIRR STATION
PORT JEFFERSON STATION NY 11776



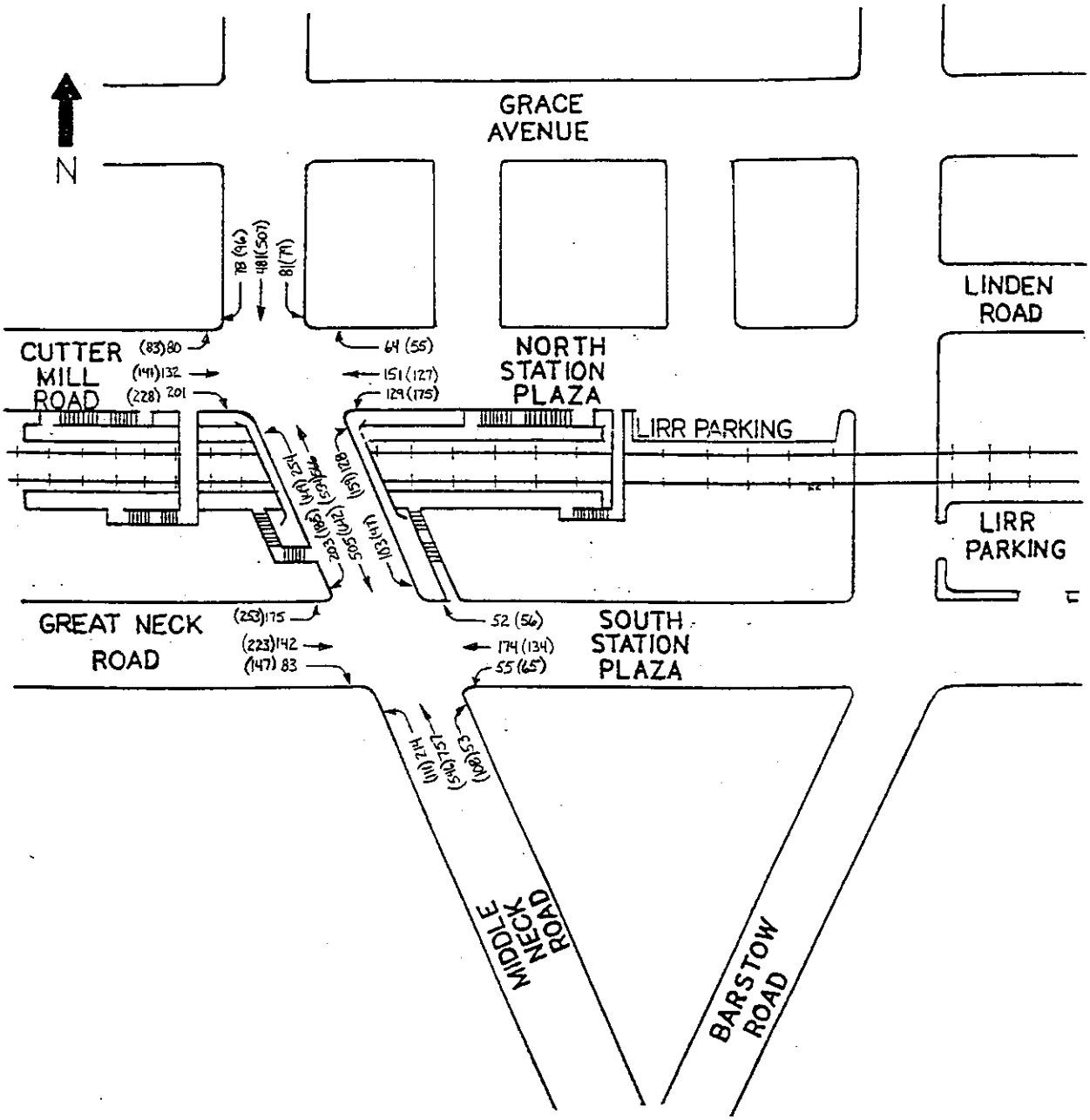
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FIGURE L30
NO BUILD LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

RONKONKOMA LIRR STATION
RONKONKOMA NY 11779

FIGURES L - 31 to L - 45

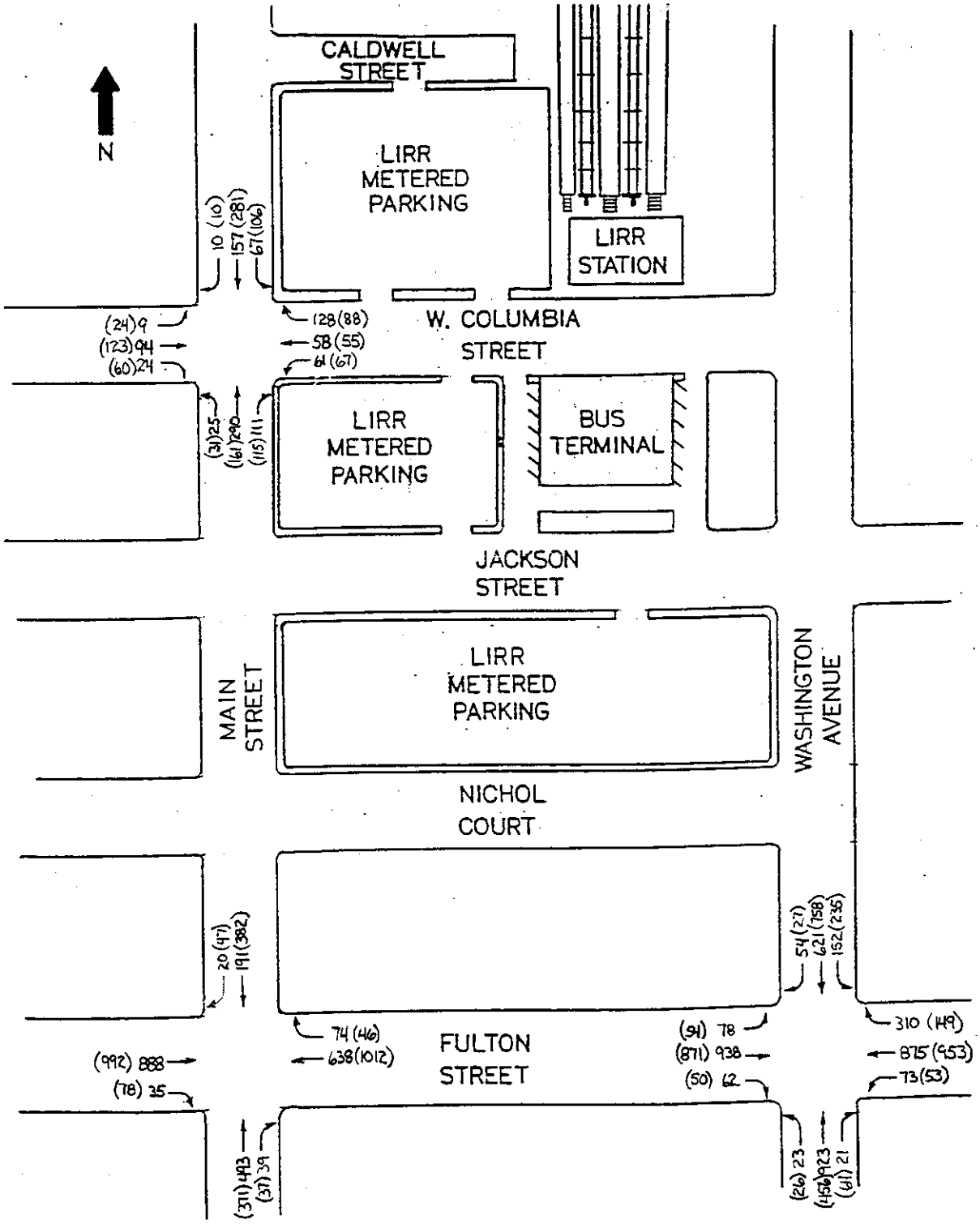
BUILD LONG ISLAND RAIL ROAD STATION AREA TRAFFIC VOLUMES



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L31
BUILD L'IRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

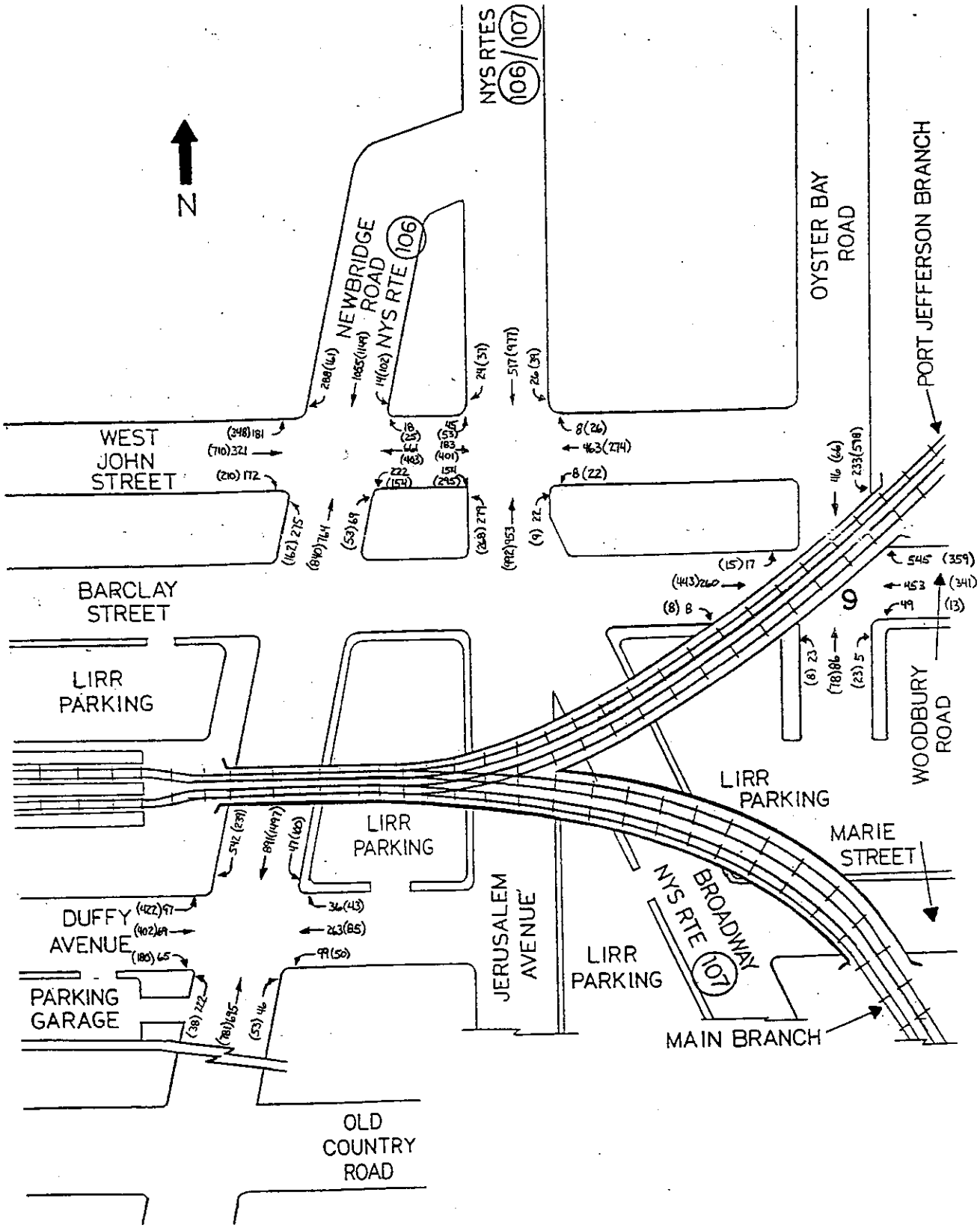
GREAT NECK LIRR STATION
GREAT NECK NY 11021



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L32
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

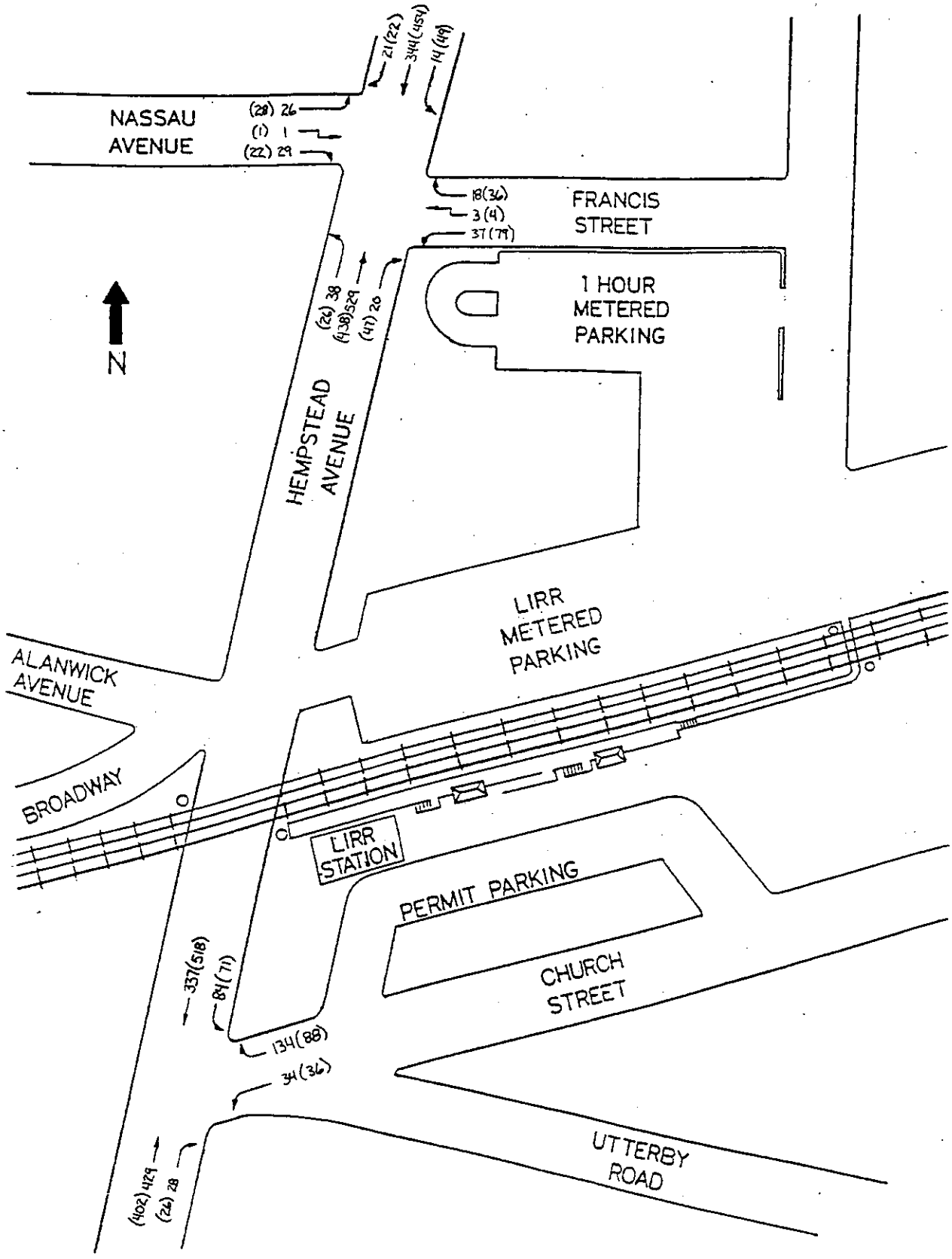
HEMPSTEAD LIRR STATION
HEMPSTEAD NY 11550



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

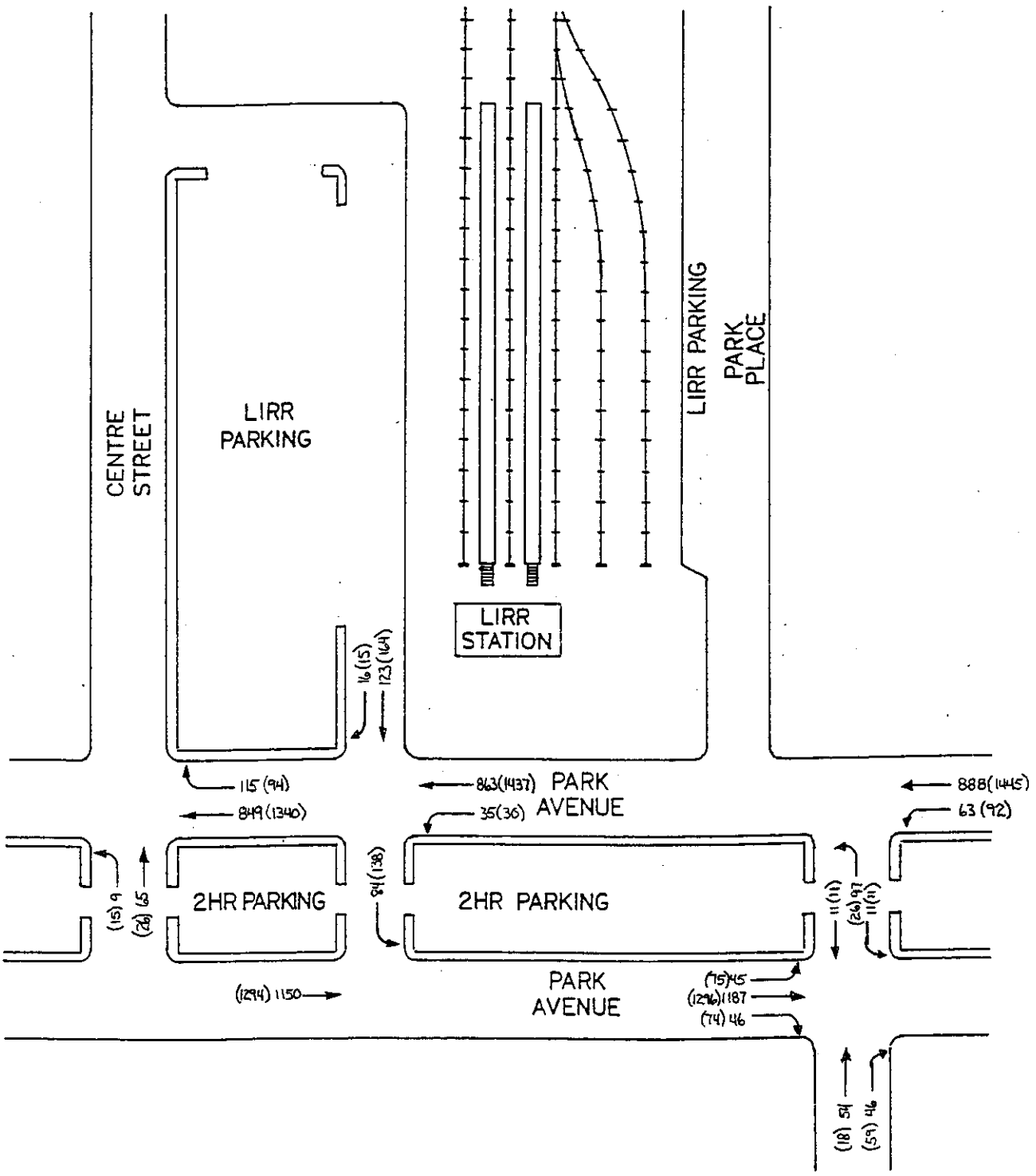
FIGURE L33
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HICKSVILLE LIRR STATION
HICKSVILLE NY 11803



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

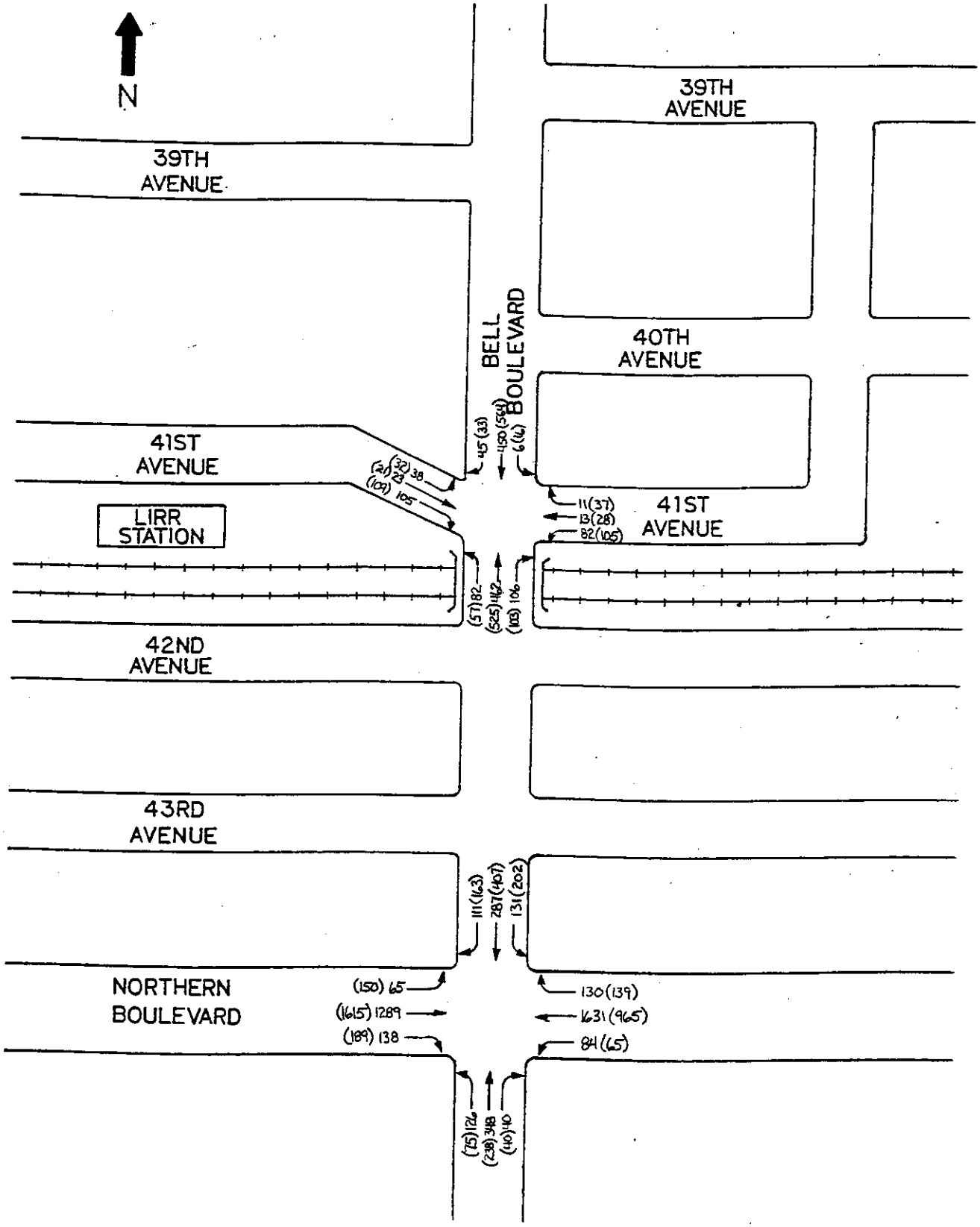
FIGURE L34
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MALVERNE LIRR STATION
MALVERNE NY 11565



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

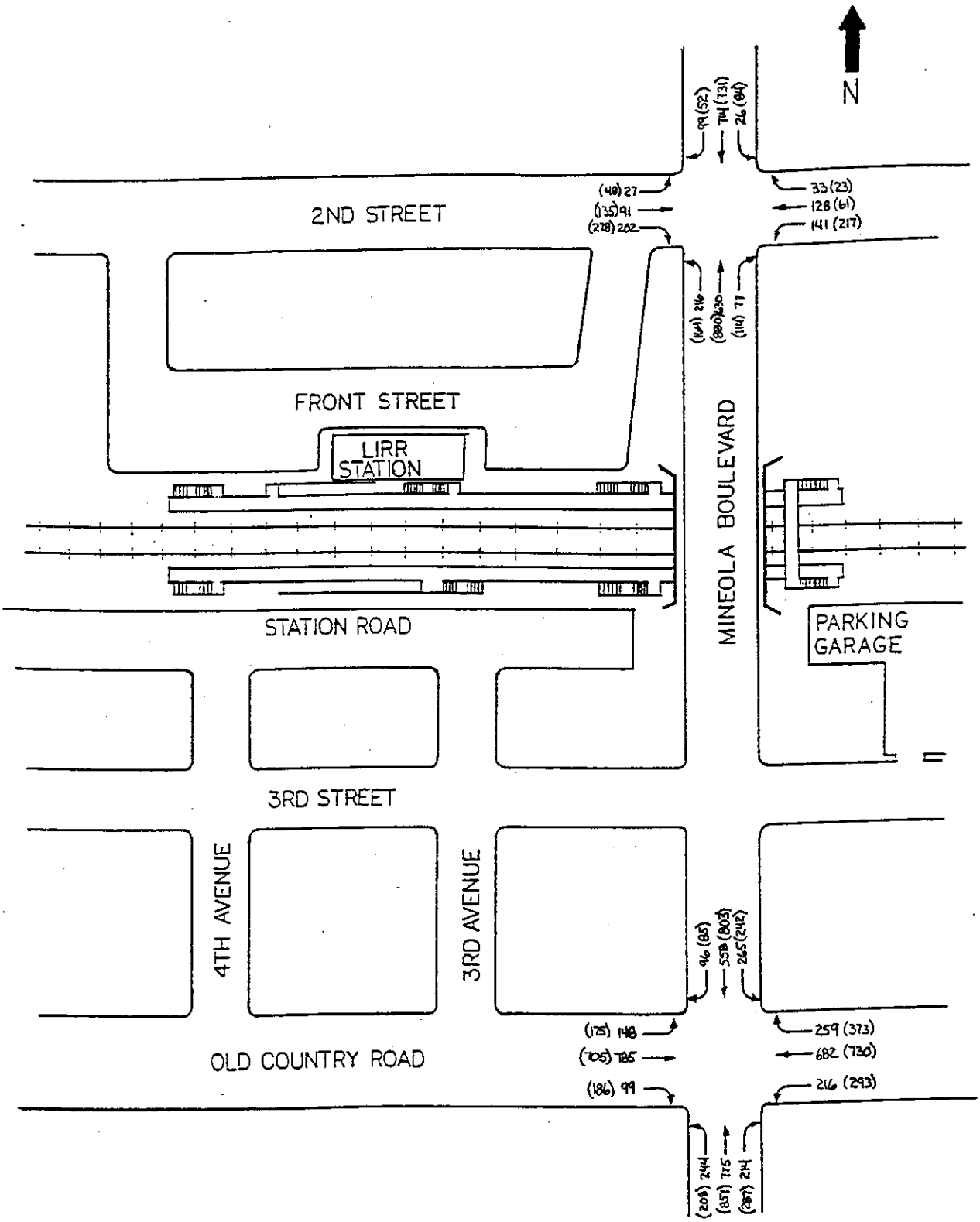
FIGURE L35
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

LONG BEACH LIRR STATION
LONG BEACH NY 11561



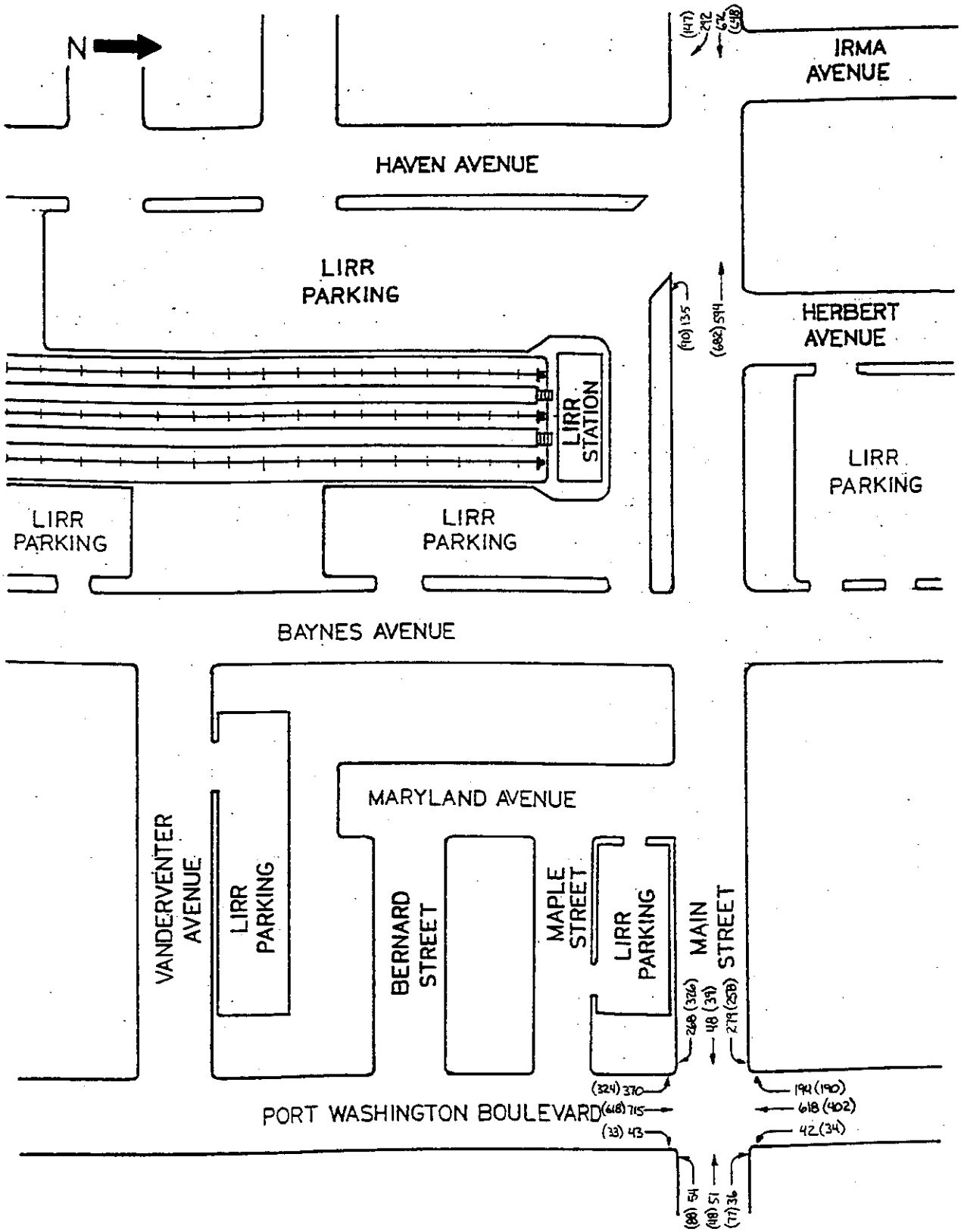
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L36
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BAYSIDE LIRR STATION
BAYSIDE NY 11361



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

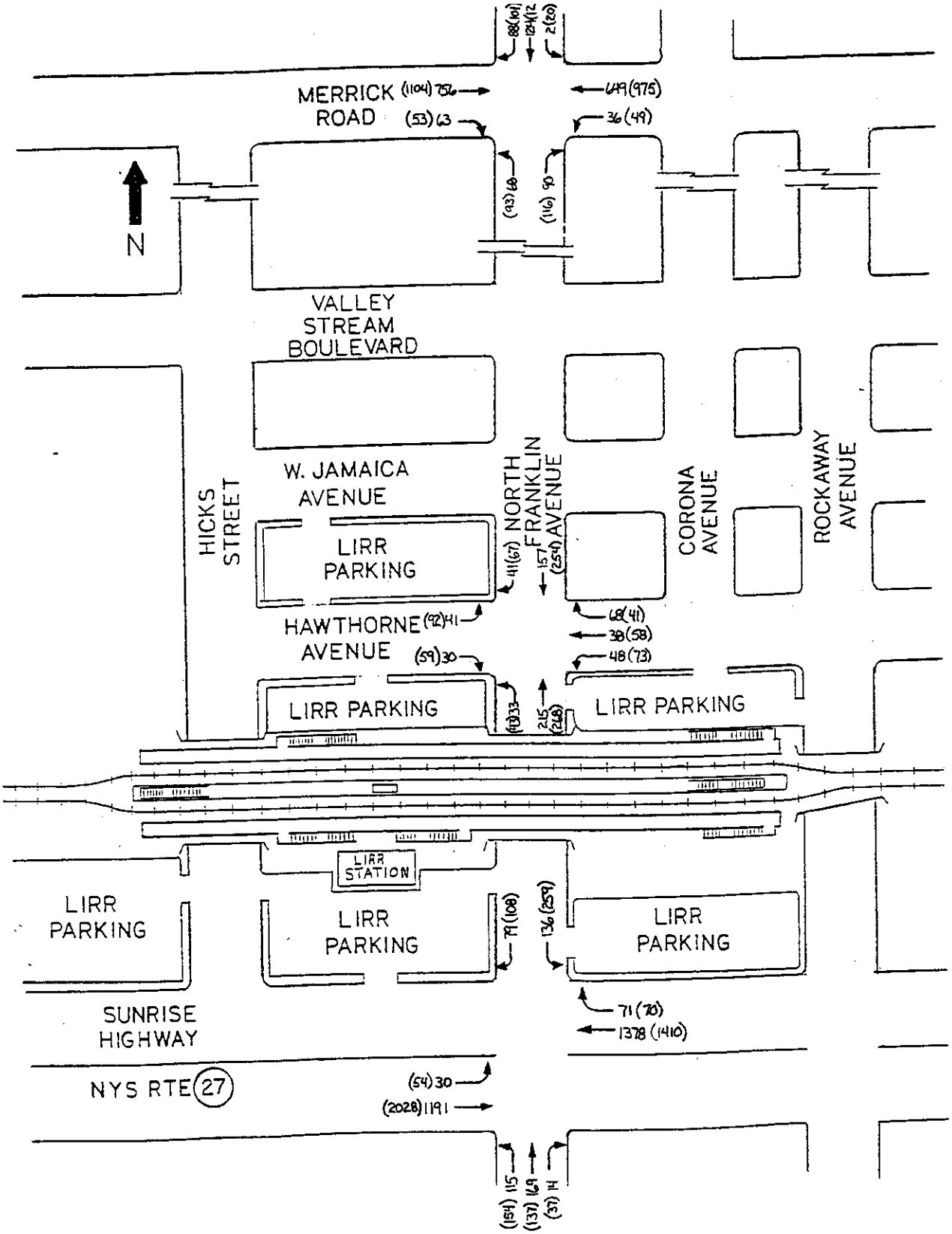
FIGURE L37
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MINEOLA LIRR STATION
MINEOLA NY 11501



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

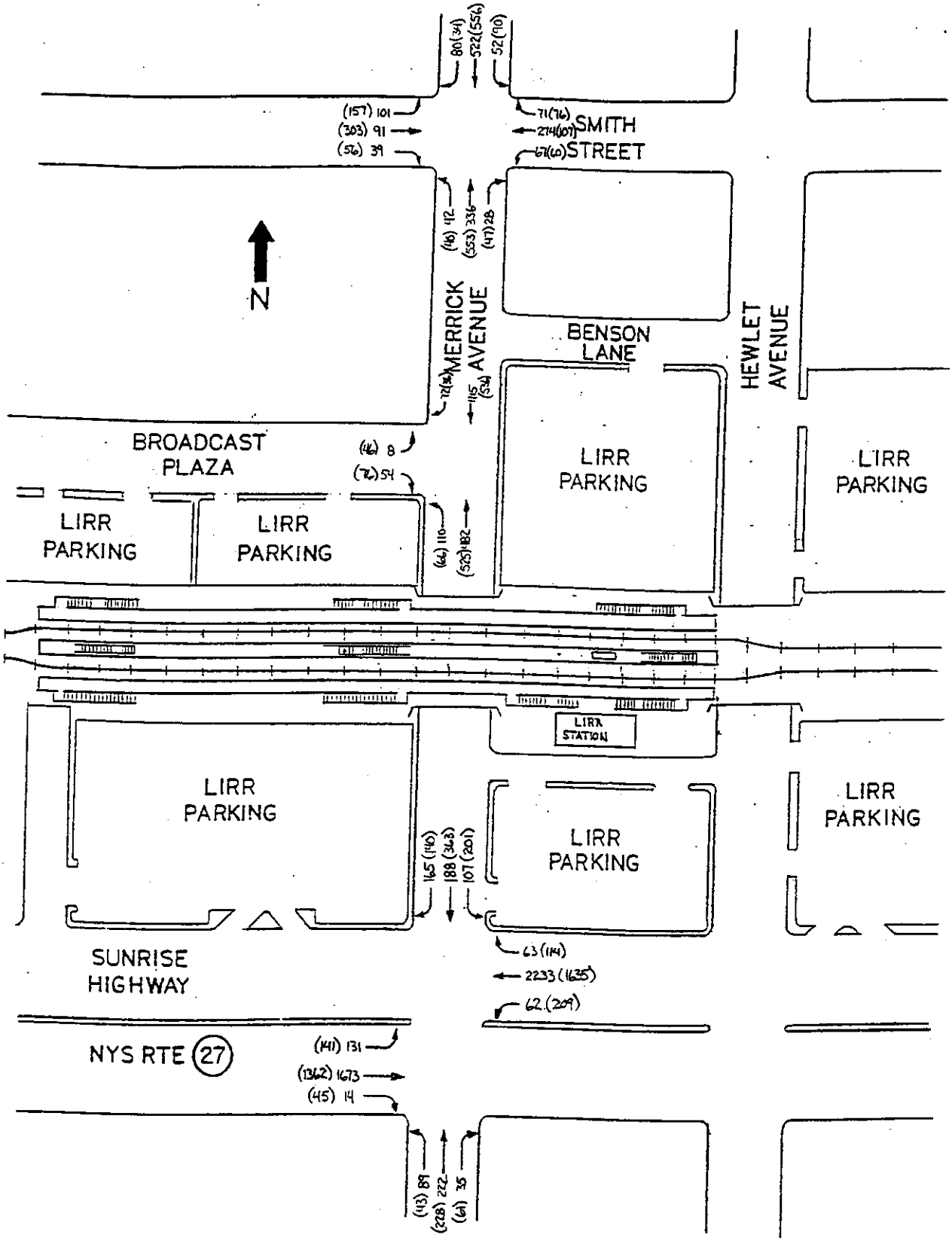
FIGURE L38
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

PORT WASHINGTON LIRR STATION
PORT WASHINGTON NY 11050



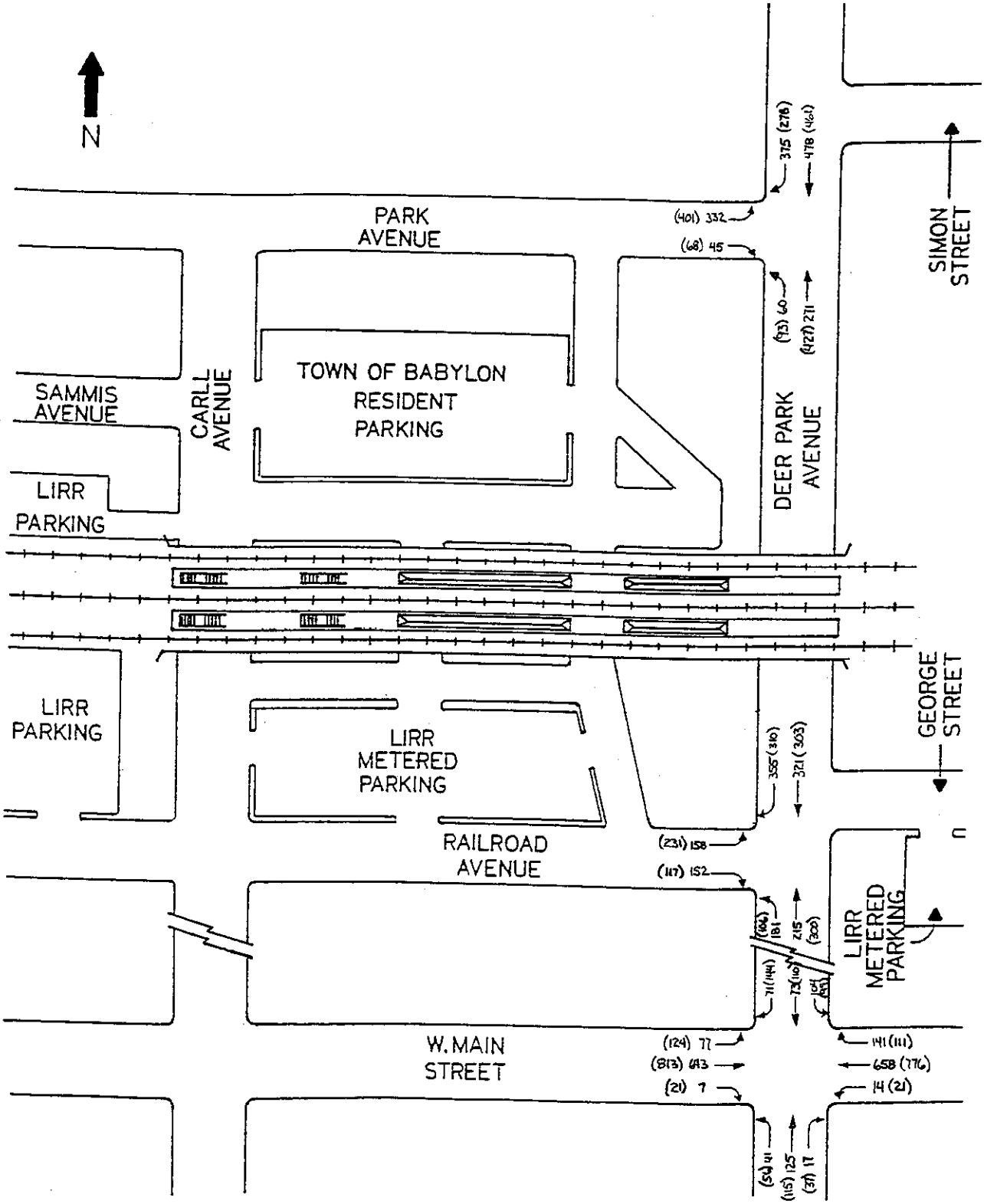
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L39
BUILD LIRR TRAFFIC VOLUMES: AM AND (PM) PEAK HOURS
VALLEY STREAM LIRR STATION
VALLEY STREAM NY 11580



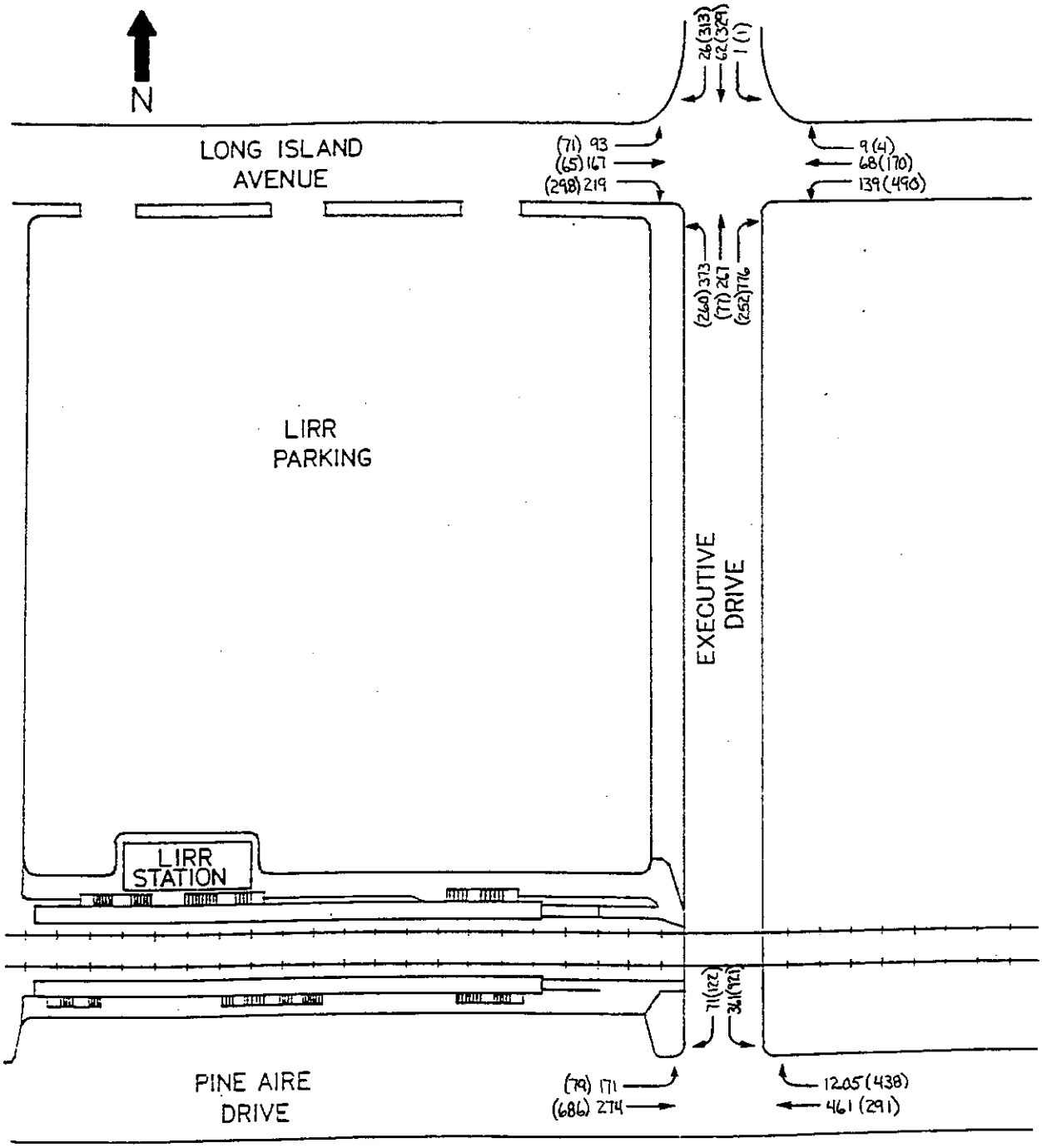
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L40
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MERRICK LIRR STATION
MERRICK NY 11566



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

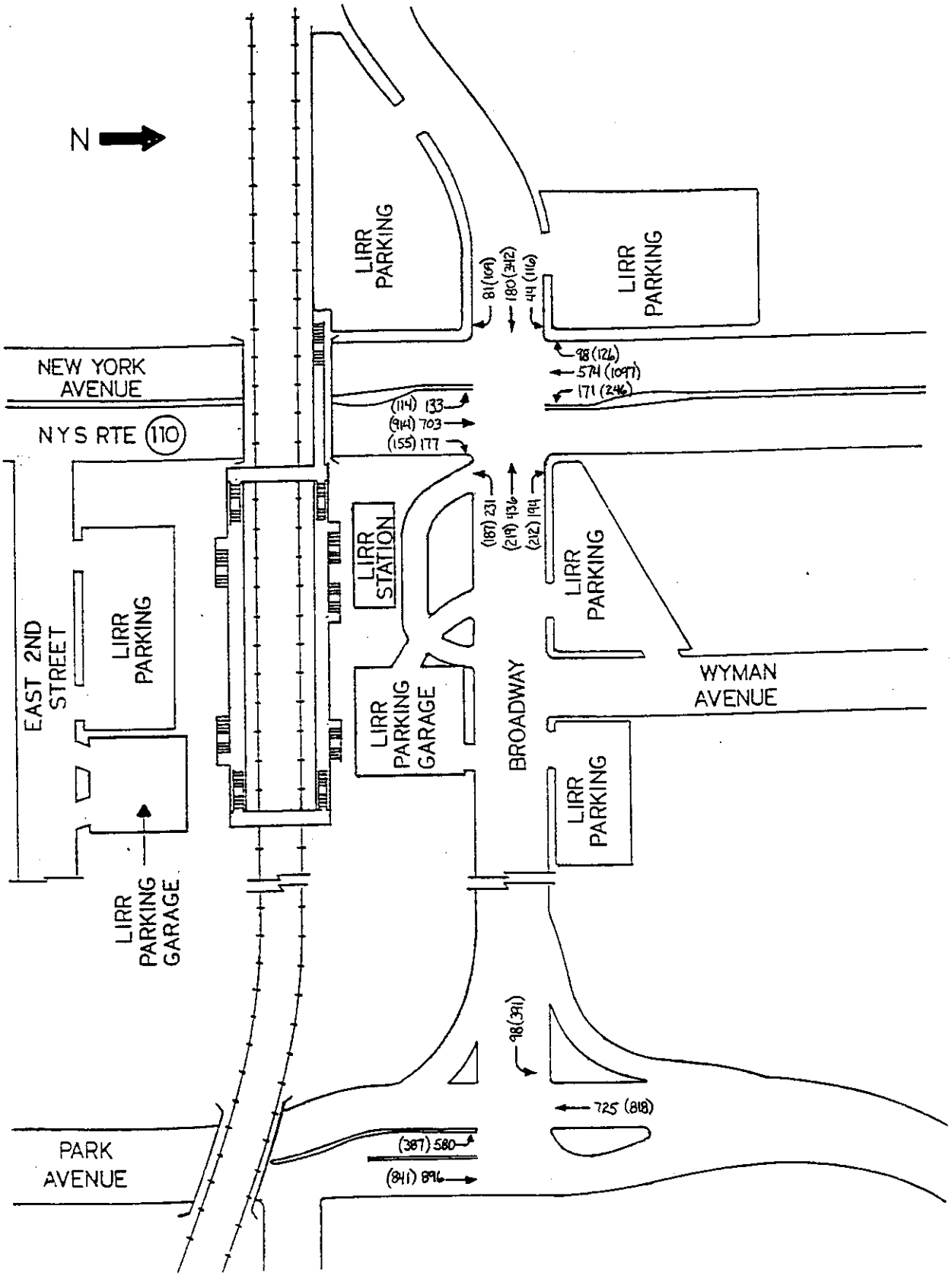
FIGURE L41
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BABYLON LIRR. STATION
BABYLON NY 11702



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L42
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

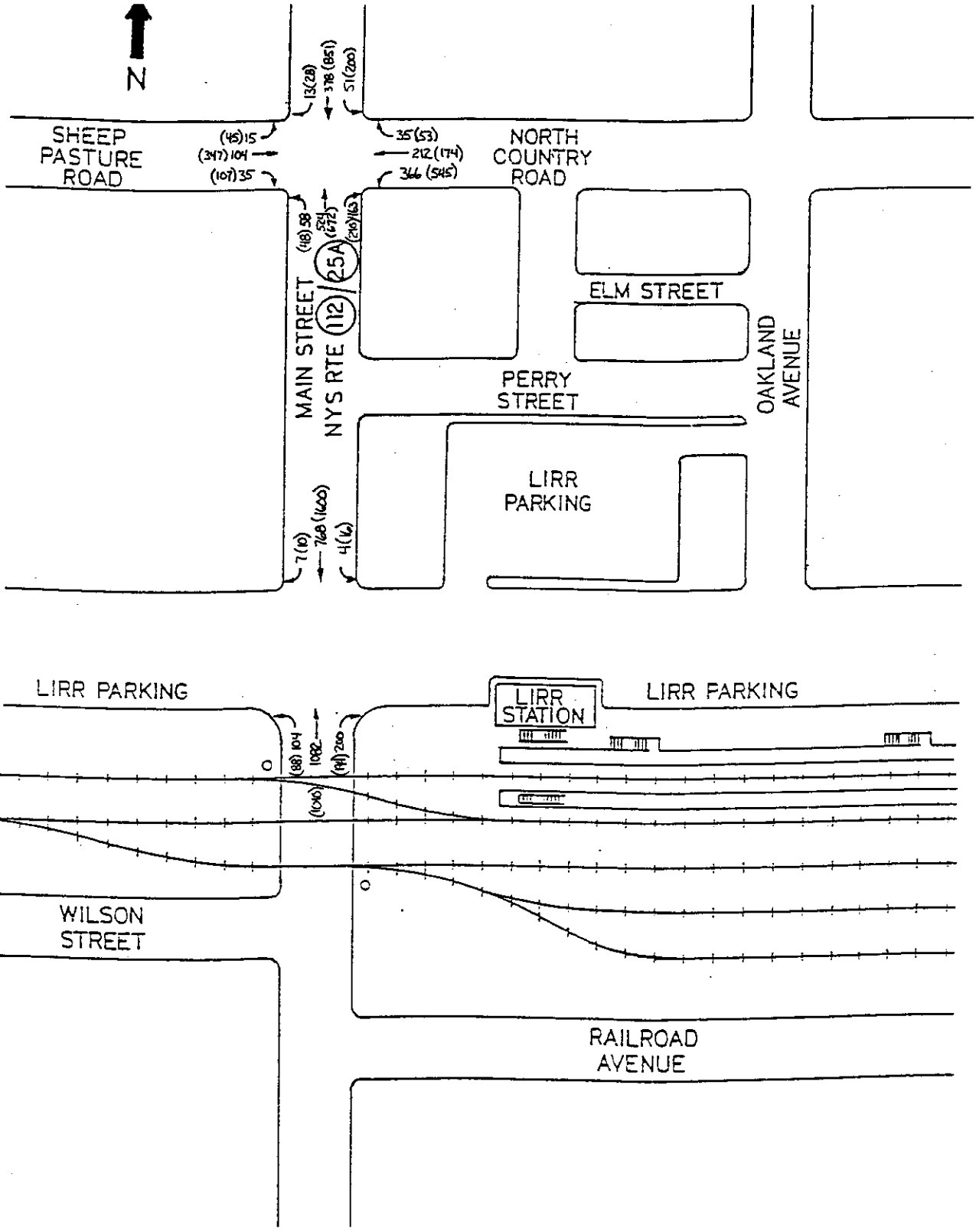
DEER PARK LIRR STATION
EDGEWOOD NY 11717



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

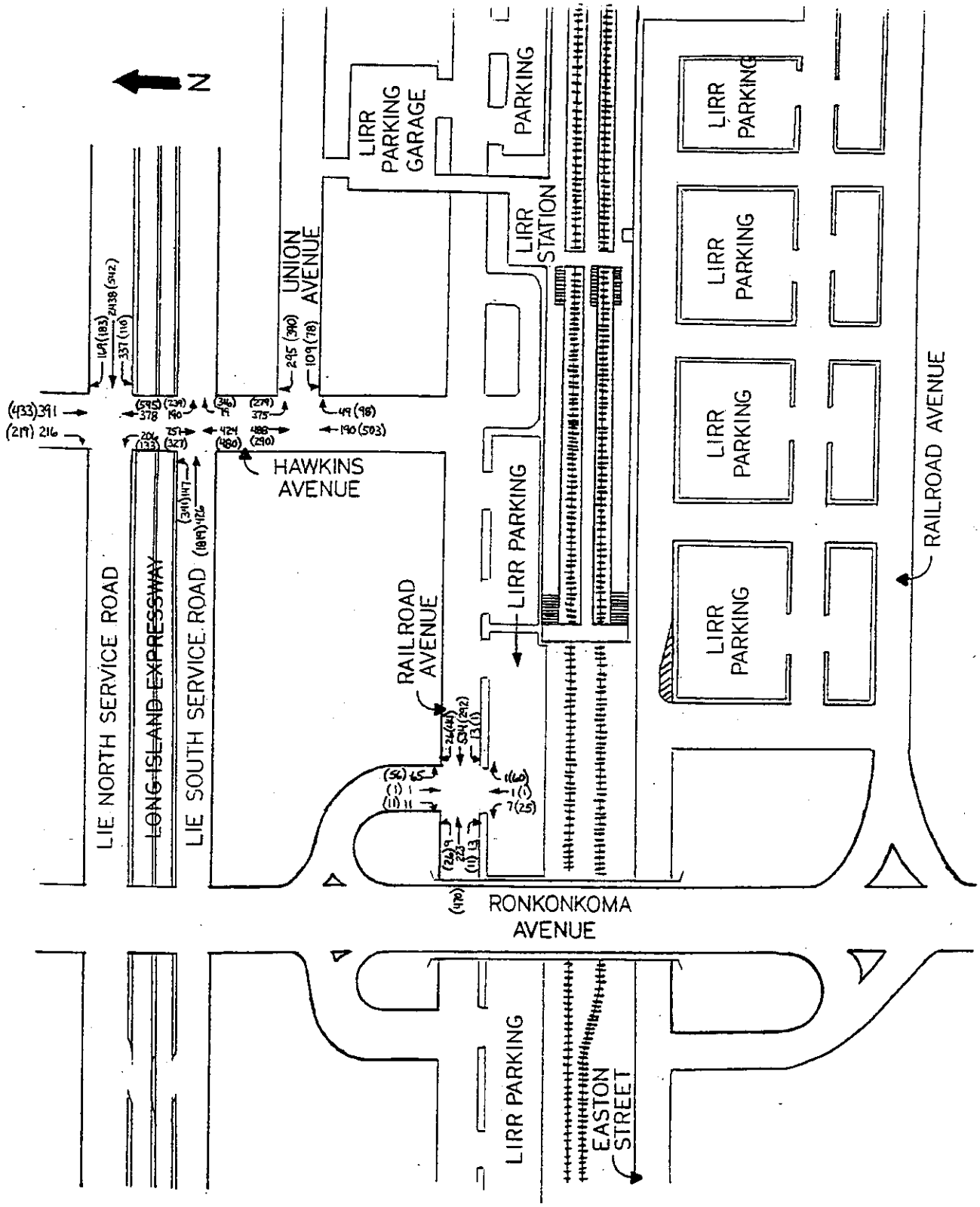
FIGURE L43
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HUNTINGTON LIRR STATION
HUNTINGTON MANOR NY 11746



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L44
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
PORT JEFFERSON LIRR STATION
PORT JEFFERSON STATION, NY 11776



Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L45
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

RONKONKOMA LIRR STATION
RONKONKOMA NY 11779

TABLE L-1

EXISTING
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 1

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	0.86	34.1	D	L	0.56	16.9	C
		TR	0.40	8.2	B	TR	0.42	8.3	B
	SB	LTR	0.66	13.5	B	LTR	0.73	15.0	B
North Station Plaza	EB	L	0.23	11.5	B	L	0.24	11.6	B
		TR	0.46	13.1	B	TR	0.59	14.6	B
	WB	L	0.56	16.1	C	L	0.91	59.3	E
		TR	0.23	11.5	B	TR	0.19	11.3	B
Overall Intersection		-	**0.79**	**13.9**	**B**	-	**0.89**	**14.3**	**B**
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	0.89	35.9	D	L	0.66	15.2	C
		TR	0.45	7.5	B	TR	0.35	6.8	B
	SB	L	0.63	13.3	B	L	0.18	6.1	B
		TR	0.42	7.2	B	TR	0.45	7.4	B
South Station Plaza	EB	DfL	0.76	24.6	C	LTR	0.88	25.4	D
		TR	0.47	14.6	B				
	WB	L	0.23	12.8	B	L	0.59	20.2	C
		TR	0.47	14.6	B	TR	0.43	14.2	B
Overall Intersection		-	**0.84**	**12.2**	**B**	-	**0.75**	**13.0**	**B**
HEMPSTEAD									
3 Main Street & West Columbia Street									
Main Street	NB	LT	0.28	4.3	A	LT	0.22	4.1	A
		R	0.09	3.7	A	R	0.10	3.7	A
	SB	LTR	0.38	4.8	A	LTR	0.65	7.5	B
West Columbia Street	EB	LTR	0.33	18.3	C	LTR	0.50	19.8	C
	WB	LTR	0.76	27.3	D	LTR	0.74	27.2	D
Overall Intersection		-	**0.49**	**11.9**	**B**	-	**0.67**	**12.4**	**B**
4 Main Street & Fulton Street (NYS Rt. 24)									
Main Street	NB	TR	0.54	17.6	C	TR	0.44	16.8	C
	SB	TR	0.51	17.9	C	TR	0.94	40.0	D
Fulton Street (NYS Rt.24)	EB	TR	0.53	3.9	A	TR	0.57	4.1	A
	WB	TR	0.39	3.4	A	TR	0.53	3.9	A
Overall Intersection		-	**0.53**	**8.0**	**B**	-	**0.70**	**10.7**	**B**
5 Fulton Street (NYS Rt. 24) & Washington Ave.									
Washington Avenue	NB	L	0.07	10.9	B	L	0.09	12.4	B
		TR	0.86	20.7	C	TR	0.49	14.1	B
	SB	L	0.46	18.5	C	L	0.66	19.8	C
		TR	0.62	15.4	C	TR	0.69	16.3	C
Fulton Street (NYS Rt. 24)	EB	LTR	0.92	20.0	C	LTR	0.89	18.0	C
	WB	LT	0.98	28.8	D	LT	1.04	43.5	E
		R	0.54	11.0	B	R	0.25	9.0	B
Overall Intersection		-	**0.86**	**20.6**	**C**	-	**0.94**	**23.4**	**C**
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	0.86	38.4	D	L	0.75	26.9	D
		T	0.38	9.6	B	T	0.47	10.3	B
		R	0.07	7.9	B	R	0.06	7.8	B
	SB	L	0.10	13.0	B	L	0.68	29.0	D
		T	0.78	20.6	C	T	0.73	19.5	C
		R	0.44	15.8	C	R	0.23	13.8	B
West John Street	EB	L	0.74	25.7	D	L	0.91	39.3	D
		T	0.37	23.7	C	T	0.83	32.9	D
		R	0.39	24.0	C	R	0.50	26.3	D
	WB	L	0.62	19.0	C	L	0.59	19.9	C
		TR	0.79	29.9	D	TR	0.55	26.2	D
Overall Intersection		-	**0.83**	**21.0**	**C**	-	**0.83**	**22.0**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue									
Newbridge Road (NYS Rt. 106)	NB	L	0.80	29.4	D	L	0.19	14.8	B
		T	0.52	17.5	C	T	0.62	18.0	C
		R	0.05	13.9	B	R	0.07	13.4	B
	SB	L	0.16	9.2	B	L	0.45	12.4	B
		T	0.68	19.6	C	T	1.01	41.8	E
		R	0.92	35.5	D	R	0.34	15.2	C
Duffy Avenue	EB	L	0.35	16.1	C	L	0.91	35.6	D
		T	0.11	13.9	B	T	0.53	16.4	C
		R	0.12	14.0	B	R	0.31	14.2	B
	WB	LTR	0.86	36.3	D	LTR	0.73	31.4	D
Overall Intersection		-	**0.89**	**23.8**	**C**	-	**0.91**	**28.8**	**D**
8 Broadway (NYS Rt 107) & East John Street									
Broadway (NYS Rt 107)	NB	L	0.76	45.1	E	L	0.60	37.0	D
		TR	0.45	7.6	B	TR	0.47	8.7	B
	SB	L	0.28	12.4	B	L	0.49	19.6	C
		TR	0.32	12.4	B	TR	0.68	18.6	C
East John Street	EB	L	0.29	24.2	C	L	0.23	20.6	C
		T	0.24	28.8	D	T	0.51	29.0	D
		R	0.33	25.1	D	R	0.60	25.8	D
	WB	LTR	0.70	34.3	D	LTR	0.55	29.6	D
Overall Intersection		-	**0.51**	**20.0**	**C**	-	**0.64**	**20.2**	**C**
9 Bay Avenue & East Barclay Street/Woodbury Road									
Bay Avenue	NB	LTR	0.26	20.0	C	LTR	0.31	20.2	C
	SB	L	0.34	17.0	C	L	0.76	24.1	C
		LT	0.38	17.3	C	LT	0.82	27.6	D
East Barclay Street	EB	LTR	0.21	6.6	B	LTR	0.35	7.2	B
Woodbury Road	WB	LT	0.34	7.1	B	LT	0.24	6.7	B
		R	0.43	1.9	A	R	0.28	1.5	A
Overall Intersection		-	**0.40**	**8.2**	**B**	-	**0.46**	**12.9**	**B**
MALVERNE									
10 Hempstead Avenue & Nassau Avenue/Francis Street – LIRR Entrance									
Hempstead Avenue	NB	LTR	0.85	15.2	C	LTR	0.74	10.8	B
	SB	LTR	0.48	6.8	B	LTR	0.80	12.9	B
Nassau Avenue	EB	LTR	0.17	10.0	B	LTR	0.19	10.1	B
Francis Street - LIRR Entrance	WB	LTR	0.19	10.1	B	LTR	0.35	10.9	B
Overall Intersection		-	**0.59**	**11.7**	**B**	-	**0.62**	**11.7**	**B**
11 Hempstead Avenue & Utterby Road									
Hempstead Avenue	NB	TR	0.83	20.3	C	TR	0.71	15.5	C
	SB	LT	0.52	6.2	B	LT	0.57	6.7	B
Utterby Road	WB	L	0.18	20.1	C	L	0.24	20.3	C
		R	0.71	29.1	D	R	0.58	24.2	C
Overall Intersection		-	**0.46**	**15.1**	**C**	-	**0.48**	**12.0**	**B**
LONG BEACH									
12a LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	L	0.11	14.5	B	L	0.15	14.7	B
West Park Avenue	EB	T	0.40	6.3	B	T	0.47	6.8	B
Overall Intersection		-	**0.30**	**7.0**	**B**	-	**0.36**	**7.5**	**B**
12b LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	TR	0.16	14.7	B	TR	0.17	14.8	B
West Park Avenue	WB	LT	0.41	6.4	B	LT	0.50	6.9	B
Overall Intersection		-	**0.32**	**7.4**	**B**	-	**0.38**	**7.8**	**B**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
13 Center Street & West Park Avenue									
Center Street	NB	LT	0.09	14.4	B	LT	0.04	14.1	B
West Park Avenue	WB	TR	0.39	6.3	B	TR	0.46	6.7	B
Overall Intersection		-	**0.29**	**6.9**	**B**	-	**0.32**	**7.0**	**B**
14a Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	TR	0.13	14.6	B	TR	0.10	14.4	B
	SB	D/L	0.03	14.1	B	D/L	0.02	14.1	B
		T	0.02	14.0	B	T	0.02	14.0	B
West Park Avenue	EB	LTR	0.47	6.8	B	LTR	0.54	7.3	B
Overall Intersection		-	**0.35**	**7.6**	**B**	-	**0.39**	**7.8**	**B**
14b Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	L	0.10	14.4	B	L	0.03	14.1	B
West Park Avenue	WB	LT	0.44	6.7	B	LT	0.51	7.0	B
Overall Intersection		-	**0.33**	**7.6**	**B**	-	**0.34**	**7.2**	**B**
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	0.90	44.9	E	LTR	0.83	40.6	E
	SB	LTR	0.53	25.5	D	LTR	0.76	29.4	D
Northern Boulevard (NYS Rt. 25A)	EB	D/L	0.54	14.1	B	-	-	-	-
		T	0.58	5.3	B	LT	0.83	8.3	B
		R	0.17	3.7	A	R	0.23	3.8	A
	WB	L	0.67	12.5	B	L	0.52	7.2	B
		T	0.74	6.9	B	T	0.45	4.6	A
		R	0.14	3.6	A	R	0.16	3.7	A
Overall Intersection		-	**0.67**	**12.8**	**B**	-	**0.81**	**13.6**	**B**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	0.93	24.0	C	LTR	0.88	17.9	C
	SB	LTR	0.58	7.9	B	LTR	0.68	9.2	B
41st Avenue	EB	LTR	0.47	11.7	B	LTR	0.48	11.8	B
	WB	LTR	0.28	10.3	B	LTR	0.53	12.5	B
Overall Intersection		-	**0.74**	**15.7**	**C**	-	**0.74**	**13.4**	**B**
MINEOLA									
17 Mineola Boulevard & Old Country Boulevard									
Mineola Boulevard	NB	L	0.90	34.2	D	L	0.70	16.5	C
		TR	0.96	32.7	D	TR	0.98	36.3	D
	SB	L	0.90	34.7	D	L	0.84	26.8	D
		TR	0.68	18.5	C	TR	0.78	20.6	C
Old Country Road	EB	L	0.64	14.3	B	L	0.66	14.8	B
		TR	0.97	35.4	D	TR	0.84	22.7	C
	WB	L	0.83	26.3	D	L	0.89	32.4	D
		T	0.68	18.6	C	T	0.67	18.4	C
		R	0.50	16.8	C	R	0.68	19.9	C
Overall Intersection		-	**0.98**	**27.2**	**D**		**0.93**	**24.7**	**C**
18 Mineola Boulevard & 2nd Street									
Mineola Boulevard	NB	L	0.92	52.3	E	L	0.55	11.7	B
		TR	0.33	4.6	A	TR	0.44	5.7	B
	SB	L	0.11	3.9	A	L	0.81	38.0	D
		TR	0.87	14.0	B	TR	0.97	33.8	D
2nd Street	EB	L	0.10	10.9	B	L	0.14	14.6	B
		TR	0.63	15.0	B	TR	0.79	24.1	C
	WB	LTR	0.95	45.7	E	LTR	0.94	51.2	E
Overall Intersection		-	**0.93**	**16.1**	**C**		**0.94**	**21.5**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
PORT WASHINGTON									
19 Main Street & LIRR Parking Entrance[3]									
Main Street	WB	L		7.9	B	L		5.5	B
Overall Intersection		-		**0.6**	**A**	-		**0.3**	**A**
20 Main Street & Port Washington Boulevard (NYS Rte. 101)									
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.05	55.5	E	L	0.81	10.1	B
		TR	0.36	2.6	A	TR	0.33	3.8	A
	SB	L	0.27	8.4	B	L	0.17	9.6	B
		TR	0.48	9.6	B	TR	0.35	10.7	B
Main Street	EB	LT	1.02	75.9	F	LT	0.87	43.8	E
		R	0.41	18.5	C	R	0.45	17.5	C
	WB	LTR	0.50	28.3	D	LTR	0.67	30.1	D
Overall Intersection		-	**1.07**	**21.1**	**C**		**0.76**	**14.0**	**B**
VALLEY STREAM									
21 South Franklin Avenue & Merrick Road									
South Franklin Avenue	NB	LR	0.44	14.7	B	LR	0.65	18.2	C
	SB	LTR	0.23	13.2	B	LTR	0.24	13.2	B
Merrick Road	EB	TR	0.39	5.1	B	TR	0.49	5.7	B
	WB	LT	0.53	6.0	B	LT	0.87	13.1	B
Overall Intersection		-	**0.50**	**7.3**	**B**	-	**0.79**	**10.4**	**B**
22 South Franklin Avenue & West Hawthorne Avenue									
South Franklin Avenue	NB	LT	0.18	7.1	B	LT	0.27	7.5	B
	SB	TR	0.13	6.9	B	TR	0.23	7.3	B
West Hawthorne Avenue	EB	LR	0.16	10.0	B	LR	0.39	11.4	B
	WB	LTR	0.16	10.0	B	LTR	0.17	10.1	B
Overall Intersection		-	**0.17**	**8.1**	**B**	-	**0.32**	**8.5**	**B**
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)									
South Franklin Avenue	NB	LTR	0.42	32.3	D	LTR	0.49	33.1	D
	SB	L	0.65	40.1	E	L	0.91	60.0	E
		R	0.20	30.6	D	R	0.28	31.2	D
Sunrise Highway (NYS Rt. 27)	EB	L	0.25	4.3	A	L	0.44	6.6	B
		T	0.35	4.5	A	T	0.55	5.7	B
	WB	T	0.42	4.8	A	T	0.41	4.8	A
		R	0.07	3.5	A	R	0.07	3.5	A
Overall Intersection		-	**0.47**	**8.7**	**B**	-	**0.63**	**10.7**	**B**
MERRICK									
24 Merrick Avenue & Broadcast Plaza[3]									
Merrick Avenue	NB	L		4.3	A	L		4.3	A
Broadcast Plaza	EB	LR		6.7	B	LR		14.1	C
Overall Intersection		-		**0.8**	**A**	-		**1.5**	**A**
25 Merrick Avenue & Smith Street									
Merrick Avenue	NB	L	0.57	20.6	C	L	0.42	16.0	C
		TR	0.79	21.3	C	TR	0.95	36.1	D
	SB	L	0.20	9.1	B	L	0.33	10.6	B
		TR	0.92	26.8	D	TR	0.86	20.6	C
Smith Street	EB	L	0.47	10.4	B	L	0.38	8.8	B
		TR	0.31	13.6	B	TR	0.67	17.8	C
	WB	L	0.16	8.0	B	L	0.24	8.8	B
		TR	0.79	22.0	C	TR	0.42	14.4	B
Overall Intersection		-	**0.85**	**20.9**	**C**	-	**0.80**	**21.8**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)									
Merrick Avenue	NB	L	0.40	30.2	D	L	0.36	27.1	D
		TR	0.58	32.5	D	TR	0.64	30.4	D
	SB	L	0.43	22.9	C	L	0.87	39.2	D
		T	0.31	22.4	C	T	0.57	22.4	C
		R	0.29	22.2	C	R	0.23	18.7	C
Sunrise Highway (NYS Rt. 27)	EB	L	0.52	36.7	D	L	0.49	32.6	D
		T	0.82	24.0	C	T	0.69	21.6	C
		R	0.03	14.2	B	R	0.08	15.6	C
	WB	L	0.23	33.4	D	L	0.67	36.6	D
		T	1.03	45.6	E	T	0.77	23.2	C
		R	0.10	14.7	B	R	0.18	16.3	C
Overall Intersection		-	**0.80**	**34.7**	**D**	-	**0.74**	**24.3**	**C**
BABYLON									
27 Deer Park Avenue & Railroad Avenue[3]									
Deer Park Avenue	NB	L		5.0	B	L		4.5	A
Railroad Avenue	EB	L		17.5	C	L		37.8	E
		R		5.3	B	R		5.0	B
Overall Intersection		-		**3.2**	**A**	-		**6.9**	**B**
28 Deer Park Avenue & Park Avenue									
Deer Park Avenue	NB	LT	0.30	4.9	A	LT	0.51	5.9	B
	SB	TR	0.85	14.0	B	TR	0.81	11.9	B
Park Avenue	EB	LR	0.66	12.3	B	LR	0.73	13.9	B
Overall Intersection		-	**0.77**	**11.2**	**B**	-	**0.78**	**10.4**	**B**
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street									
Fire Island Avenue	NB	LTR	0.50	24.4	C	LTR	0.80	37.3	D
Deer Park Avenue	SB	DfL	0.50	25.0	C	LTR	0.87	37.9	D
		TR	0.44	23.7	C	-	-	-	-
West Main Street	EB	L	0.41	8.8	B	L	0.64	16.1	C
		TR	0.52	5.2	B	TR	0.62	6.2	B
East Main Street	WB	L	0.11	5.6	B	L	0.17	5.9	B
		TR	0.72	11.0	B	TR	0.71	10.7	B
Overall Intersection		-	**0.66**	**11.9**	**B**	-	**0.77**	**16.2**	**C**
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.39	9.2	B	L	0.47	10.4	B
		TR	0.55	10.8	B	TR	0.18	8.2	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.19	20.5	C	T	0.75	28.8	D
		R	0.07	20.0	C	R	0.32	9.0	B
Long Island Avenue	EB	L	0.23	18.4	C	L	0.24	18.5	C
		T	0.16	18.0	C	T	0.07	17.5	C
		R	0.45	20.2	C	R	0.57	21.8	C
	WB	L	0.26	12.6	B	L	0.81	22.6	C
		T	0.05	11.1	B	T	0.12	11.5	B
		R	0.02	10.9	B	R	0.01	10.9	B
Overall Intersection		-	**0.44**	**12.8**	**B**	-	**0.73**	**17.1**	**C**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	0.41	19.7	C	L	0.74	26.5	D
		LR	0.40	19.7	C	LR	0.73	26.4	D
Pine Aire Drive	EB	L	0.34	6.8	B	L	0.14	9.7	B
		T	0.23	4.2	A	T	0.59	9.3	B
	WB	LT	0.56	14.9	B	LT	0.46	18.6	C
		R	0.97	27.6	D	R	0.42	8.7	B
Overall Intersection		-	**0.48**	**19.5**	**C**	-	**0.64**	**16.8**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
HUNTINGTON									
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway									
New York Avenue (NYS Rt. 110)	NB	L	0.31	8.5	B	L	0.41	12.1	B
		T	0.43	16.1	C	T	0.54	17.2	C
		R	0.24	14.5	B	R	0.21	14.2	B
	SB	L	0.44	9.5	B	L	0.82	28.7	D
		T	0.36	15.4	C	T	0.67	19.2	C
		R	0.14	13.7	B	R	0.18	14.0	B
Railroad Street	EB	L	0.35	28.6	D	L	0.45	28.9	D
		TR	0.68	33.0	D	TR	0.96	54.6	E
Broadway	WB	L	0.62	21.5	C	L	0.63	23.0	C
		T	0.61	22.6	C	T	0.32	19.1	C
		R	0.36	19.4	C	R	0.40	19.9	C
Overall Intersection		-	**0.61**	**18.3**	**C**	-	**0.80**	**23.1**	**C**
33 Park Avenue & Broadway									
Park Avenue	NB	L	0.95	42.5	E	L	0.72	22.5	C
		T	0.32	2.3	A	T	0.28	2.2	A
	SB	T	0.43	9.9	B	T	0.43	9.9	B
Broadway	EB	L	0.31	19.4	C	L	0.78	29.1	D
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.58**	**11.6**	**B**
PORT JEFFERSON									
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]									
Main Street	NB	L		4.5	A	L		25.3	D
	SB	L		6.4	B	L		10.1	C
Overall Intersection		-		**0.2**	**A**	-		**0.8**	**A**
35 Main Street (NYS Rt. 25A) & North Country Road									
Main Street (NYS Rt. 25A)	NB	LTR	0.85	16.1	C	LTR	0.97	37.3	D
	SB	L	0.29	6.5	B	L	0.94	60.2	F
		TR	0.26	6.0	B	TR	0.59	12.0	B
Sheep Pasture Road	EB	LTR	0.25	23.3	C	LTR	0.63	28.5	D
North Country Road	WB	L	0.79	27.9	D	L	0.93	39.8	D
		TR	0.35	18.1	C	TR	0.22	15.7	C
Overall Intersection		-	**0.81**	**17.1**	**C**	-	**0.92**	**28.7**	**D**
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.36	9.5	B	TR	0.63	9.1	B
	SB	L	0.67	5.8	B	L	0.80	22.0	C
		T	0.36	3.2	A	T	0.18	2.2	A
Union Avenue	WB	L	0.26	16.6	C	L	0.21	19.9	C
		R	0.32	8.5	B	R	0.49	15.1	C
Overall Intersection		-	**0.49**	**6.8**	**B**	-	**0.58**	**11.8**	**B**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.65	32.5	D	L	0.31	22.7	C
		T	0.30	19.6	C	T	0.30	15.2	C
	SB	TR	0.66	29.6	D	TR	0.48	24.0	C
L.I.E. North Service Road	WB	LTR	0.83	12.6	B	LTR	0.31	13.2	B
Overall Intersection		-	**0.83**	**16.3**	**C**	-	**0.46**	**17.3**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.46	21.5	C	TR	0.83	33.6	D
	SB	L	0.68	32.5	D	L	0.48	24.8	C
		T	0.45	17.4	C	T	0.18	13.9	B
L.I.E. South Service Road	EB	LT	0.24	10.9	B	LT	0.79	16.0	C
Overall Intersection		-	**0.53**	**18.0**	**C**	-	**0.75**	**19.8**	**C**
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.02	12.2	B	L	0.05	12.3	B
		TR	0.01	12.2	B	TR	0.16	12.6	B
Ronkonkoma Avenue Ramp	SB	L	0.18	12.6	B	L	0.20	12.7	B
		TR	0.03	12.2	B	TR	0.04	12.3	B
Railroad Avenue	EB	L	0.04	1.9	A	L	0.04	1.9	A
		T	0.19	2.1	A	T	0.34	2.5	A
		R	0.01	1.9	A	R	0.01	1.9	A
	WB	L	0.01	1.8	A	L	0.01	1.8	A
		TR	0.50	3.1	A	TR	0.29	2.3	A
Overall Intersection		-	**0.42**	**3.7**	**A**	-	**0.31**	**4.1**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE L-2

2010 NO BUILD
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 2

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	1.03	*	F*	L	0.67	22.2	C
		TR	0.44	8.4	B	TR	0.46	8.6	B
	SB	LTR	0.74	15.4	C	LTR	0.83	18.6	C
North Station Plaza	EB	L	0.26	11.8	B	L	0.27	11.8	B
		TR	0.50	13.5	B	TR	0.64	15.4	C
	WB	L	0.69	21.5	C	L	1.32	*	F*
		TR	0.25	11.6	B	TR	0.21	11.4	B
Overall Intersection		-	*	*	F*	-	**1.09**	**26.2**	**D**
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	1.19	*	F*	L	0.87	38.2	D
		TR	0.49	7.7	B	TR	0.38	7.0	B
	SB	L	0.83	31.4	D	L	0.22	6.3	B
		TR	0.45	7.5	B	TR	0.49	7.7	B
South Station Plaza	EB	DfL	0.91	41.4	E	LTR	0.98	39.0	D
		TR	0.52	15.1	C	-			-
	WB	L	0.27	13.1	B	L	0.76	33.8	D
		TR	0.52	15.1	C	TR	0.47	14.5	B
Overall Intersection		-	*	*	F*	-	**0.91**	**17.9**	**C**
HEMPSTEAD									
3 Main Street & West Columbia Street									
Main Street	NB	LT	0.31	4.4	A	LT	0.25	4.2	A
		R	0.10	3.7	A	R	0.11	3.7	A
	SB	LTR	0.43	5.1	B	LTR	0.72	9.0	B
West Columbia Street	EB	LTR	0.35	18.5	C	LTR	0.55	20.4	C
	WB	LTR	0.85	34.1	D	LTR	0.86	36.4	D
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.76**	**14.8**	**B**
4 Main Street & Fulton Street (NYS Rt. 24)									
Main Street	NB	TR	0.59	18.1	C	TR	0.48	17.1	C
	SB	TR	0.56	18.5	C	TR	1.02	58.5	E
Fulton Street (NYS Rt.24)	EB	TR	0.57	4.2	A	TR	0.62	4.4	A
	WB	TR	0.43	3.5	A	TR	0.57	4.1	A
Overall Intersection		-	**0.58**	**8.3**	**B**	-	**0.76**	**13.3**	**B**
5 Fulton Street (NYS Rt. 24) & Washington Ave.									
Washington Avenue	NB	L	0.08	11.5	B	L	0.09	13.2	B
		TR	0.94	26.1	D	TR	0.53	14.4	B
	SB	L	0.50	19.3	C	L	0.74	23.2	C
		TR	0.68	16.1	C	TR	0.75	17.3	C
Fulton Street (NYS Rt. 24)	EB	LTR	1.04	41.3	E	LTR	0.98	28.7	D
	WB	LT	1.13	*	F*	LT	1.17	*	F*
		R	0.59	11.5	B	R	0.27	9.1	B
Overall Intersection		-	*	*	F*	-	*	*	F*
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	0.96	57.2	E	L	0.82	33.3	D
		T	0.41	9.9	B	T	0.51	10.7	B
		R	0.08	7.9	B	R	0.06	7.8	B
	SB	L	0.13	13.2	B	L	0.81	46.1	E
		T	0.84	22.8	C	T	0.80	21.1	C
		R	0.49	16.3	C	R	0.25	14.0	B
West John Street	EB	L	0.80	30.3	D	L	1.04	*	F*
		T	0.40	23.9	C	T	0.90	37.9	D
		R	0.43	24.4	C	R	0.55	27.0	D
	WB	L	0.69	21.0	C	L	0.64	21.3	C
		TR	0.85	32.7	D	TR	0.59	26.8	D
Overall Intersection		-	**0.87**	**23.6**	**C**	-	*	*	F*

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue									
Newbridge Road (NYS Rt. 106)	NB	L	0.87	37.1	D	L	0.21	14.9	B
		T	0.56	18.0	C	T	0.68	18.8	C
		R	0.06	13.9	B	R	0.08	13.4	B
	SB	L	0.19	9.5	B	L	0.48	13.3	B
		T	0.73	20.6	C	T	1.09	*	F*
		R	1.00	50.5	E	R	0.37	15.5	C
Duffy Avenue	EB	L	0.39	16.5	C	L	1.01	58.1	E
		T	0.11	13.9	B	TR	0.57	17.0	C
		R	0.13	14.0	B	R	0.33	14.4	B
	WB	LTR	0.94	46.7	E	LTR	0.86	43.8	E
Overall Intersection		-	**0.96**	**28.5**	**D**	-	*	*	F*
8 Broadway (NYS Rt 107) & East John Street									
Broadway (NYS Rt 107)	NB	L	0.83	49.2	E	L	0.65	38.0	D
		TR	0.49	7.9	B	TR	0.51	9.1	B
	SB	L	0.31	12.9	B	L	0.56	22.9	C
		TR	0.35	12.6	B	TR	0.73	19.8	C
East John Street	EB	L	0.35	24.8	C	L	0.25	20.8	C
		T	0.26	29.0	D	T	0.55	29.5	D
		R	0.36	25.4	D	R	0.65	27.0	D
	WB	LTR	0.76	36.0	D	LTR	0.62	30.7	D
Overall Intersection		-	**0.56**	**20.9**	**C**	-	**0.69**	**21.0**	**C**
9 Bay Avenue & East Barclay Street/Woodbury Road									
Bay Avenue	NB	LTR	0.28	20.1	C	LTR	0.34	20.3	C
	SB	L	0.37	17.2	C	L	0.83	27.9	D
		LT	0.41	17.5	C	LT	0.88	33.5	D
East Barclay Street	EB	LTR	0.23	6.7	B	LTR	0.38	7.3	B
Woodbury Road	WB	LT	0.37	7.3	B	LT	0.26	6.8	B
		R	0.47	2.1	A	R	0.31	1.6	A
Overall Intersection		-	**0.44**	**8.3**	**B**	-	**0.50**	**14.5**	**B**
MALVERNE									
10 Hempstead Avenue & Nassau Avenue/Francis Street – LIRR Entrance									
Hempstead Avenue	NB	LTR	0.94	25.0	C	LTR	0.85	15.7	C
	SB	LTR	0.53	7.3	B	LTR	0.91	20.3	C
Nassau Avenue	EB	LTR	0.18	10.1	B	LTR	0.20	10.2	B
Francis Street - LIRR Entrance	WB	LTR	0.20	10.2	B	LTR	0.38	11.2	B
Overall Intersection		-	**0.65**	**17.1**	**C**	-	**0.70**	**17.1**	**C**
11 Hempstead Avenue & Utterby Road									
Hempstead Avenue	NB	TR	0.90	25.8	D	TR	0.77	17.4	C
	SB	LT	0.57	6.7	B	LT	0.63	7.2	B
Utterby Road	WB	L	0.20	20.2	C	L	0.26	20.4	C
		R	0.77	33.0	D	R	0.62	25.6	D
Overall Intersection		-	**0.50**	**18.0**	**C**	-	**0.52**	**13.1**	**B**
LONG BEACH									
12a LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	L	0.12	14.5	B	L	0.17	14.8	B
West Park Avenue	EB	T	0.43	6.5	B	T	0.51	7.1	B
Overall Intersection		-	**0.32**	**7.2**	**B**	-	**0.39**	**7.8**	**B**
12b LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	TR	0.17	14.8	B	TR	0.17	14.8	B
West Park Avenue	WB	LT	0.45	6.6	B	LT	0.51	7.0	B
Overall Intersection		-	**0.35**	**7.6**	**B**	-	**0.39**	**7.9**	**B**

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
13 Center Street & West Park Avenue									
Center Street	NB	LT	0.09	14.4	B	LT	0.04	14.2	B
West Park Avenue	WB	TR	0.43	6.5	B	TR	0.50	7.0	B
Overall Intersection		-	**0.31**	**7.1**	**B**	-	**0.34**	**7.2**	**B**
14a Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	TR	0.14	14.6	B	TR	0.11	14.5	B
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B
		T	0.02	14.0	B	T	0.02	14.0	B
West Park Avenue	EB	LTR	0.51	7.0	B	LTR	0.59	7.7	B
Overall Intersection		-	**0.38**	**7.8**	**B**	-	**0.42**	**8.1**	**B**
14b Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	L	0.11	14.5	B	L	0.03	14.1	B
West Park Avenue	WB	LT	0.48	6.9	B	LT	0.55	7.4	B
Overall Intersection		-	**0.35**	**7.8**	**B**	-	**0.37**	**7.5**	**B**
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	1.06	*	F*	LTR	0.95	53.9	E
	SB	LTR	0.60	26.4	D	LTR	0.85	32.7	D
Northern Boulevard (NYS Rt. 25A)	EB	DfL	0.70	25.2	D	-	-	-	-
		T	0.65	5.8	B	LT	0.94	13.3	B
		R	0.19	3.7	A	R	0.25	3.9	A
	WB	L	0.79	22.6	C	L	0.61	10.2	B
		T	0.83	8.3	B	T	0.50	4.9	A
		R	0.16	3.6	A	R	0.18	3.7	A
Overall Intersection		-	*	*	F*	-	**0.91**	**17.5**	**C**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	1.08	63.7	F	LTR	1.07	59.5	E
	SB	LTR	0.65	8.8	B	LTR	0.78	11.8	B
41st Avenue	EB	LTR	0.53	12.4	B	LTR	0.54	12.6	B
	WB	LTR	0.31	10.5	B	LTR	0.62	14.2	B
Overall Intersection		-	**0.86**	**33.7**	**D**	-	**0.89**	**31.3**	**D**
MINEOLA									
17 Mineola Boulevard & Old Country Boulevard									
Mineola Boulevard	NB	L	0.98	50.2	E	L	0.76	19.5	C
		TR	1.04	52.4	E	TR	1.07	*	F*
	SB	L	0.93	41.6	E	L	0.91	36.7	D
		TR	0.70	18.8	C	TR	0.85	23.0	C
Old Country Road	EB	L	0.70	16.5	C	L	0.71	17.1	C
		TR	1.06	57.4	E	TR	0.91	27.4	D
	WB	L	0.90	36.1	D	L	0.97	50.1	E
		T	0.74	19.7	C	T	0.73	19.4	C
		R	0.54	17.4	C	R	0.74	21.8	C
Overall Intersection		-	**1.00**	**38.7**	**D**	-	*	*	F*
18 Mineola Boulevard & 2nd Street									
Mineola Boulevard	NB	L	1.08	*	F*	L	0.60	14.0	B
		TR	0.36	4.7	A	TR	0.48	5.9	B
	SB	L	0.14	4.0	A	L	0.92	59.4	E
		TR	0.95	21.4	C	TR	1.06	*	F*
2nd Street	EB	L	0.12	11.0	B	L	0.16	14.7	B
		TR	0.68	16.1	C	TR	0.85	28.8	D
	WB	LTR	1.21	*	F*	LTR	1.06	*	F*
Overall Intersection		-	*	*	F*	-	*	*	F*

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
PORT WASHINGTON									
19 Main Street & LIRR Parking Entrance[3]									
Main Street	WB	L		9.2	B	L		6.0	B
Overall Intersection		-		**0.6**	**A**	-		**0.3**	**A**
20 Main Street & Port Washington Boulevard (NYS Rte. 101)									
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.23	*	F*	L	0.96	27.0	D
		TR	0.40	2.7	A	TR	0.36	3.9	A
	SB	L	0.33	9.0	B	L	0.22	9.9	B
		TR	0.53	10.0	B	TR	0.38	10.9	B
Main Street	EB	LT	1.20	*	F*	LT	0.99	67.5	F
		R	0.45	18.9	C	R	0.50	18.2	C
	WB	LTR	0.62	31.2	D	LTR	0.99	67.8	F
Overall Intersection		-	*	*	**F***	-	**0.95**	**22.5**	**C**
VALLEY STREAM									
21 South Franklin Avenue & Merrick Road									
South Franklin Avenue	NB	LR	0.49	15.3	C	LR	0.72	20.7	C
	SB	LTR	0.26	13.3	B	LTR	0.27	13.3	B
Merrick Road	EB	TR	0.42	5.3	B	TR	0.53	5.9	B
	WB	LT	0.61	6.7	B	LT	0.98	24.7	C
Overall Intersection		-	**0.57**	**7.7**	**B**	-	**0.89**	**15.4**	**C**
22 South Franklin Avenue & West Hawthorne Avenue									
South Franklin Avenue	NB	LT	0.19	7.2	B	LT	0.29	7.6	B
	SB	TR	0.15	7.0	B	TR	0.25	7.4	B
West Hawthorne Avenue	EB	LR	0.18	10.1	B	LR	0.38	11.3	B
	WB	LTR	0.17	10.1	B	DfL	0.17	10.1	B
						TR	0.17	10.1	B
Overall Intersection		-	**0.19**	**8.2**	**B**	-	**0.33**	**8.6**	**B**
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)									
South Franklin Avenue	NB	LTR	0.45	32.7	D	LTR	0.53	33.6	D
	SB	L	0.78	51.6	E	L	0.99	79.9	F
		R	0.23	30.8	D	R	0.31	31.4	D
Sunrise Highway (NYS Rt. 27)	EB	L	0.28	4.5	A	L	0.49	7.6	B
		T	0.38	4.6	A	T	0.60	6.1	B
	WB	T	0.46	5.1	B	T	0.45	5.0	A
		R	0.08	3.5	A	R	0.07	3.5	A
Overall Intersection		-	**0.53**	**9.3**	**B**	-	**0.69**	**12.0**	**B**
MERRICK									
24 Merrick Avenue & Broadcast Plaza[3]									
Merrick Avenue	NB	L		4.6	A	L		4.6	A
Broadcast Plaza	EB	LR		7.5	B	LR		17.6	C
Overall Intersection		-		**0.9**	**A**	-		**1.9**	**A**
25 Merrick Avenue & Smith Street									
Merrick Avenue	NB	L	0.61	22.9	C	L	0.46	16.8	C
		TR	0.85	25.2	D	TR	1.03	*	F*
	SB	L	0.22	9.5	B	L	0.36	10.8	B
		TR	1.00	41.7	E	TR	0.94	28.8	D
Smith Street	EB	L	0.52	11.2	B	L	0.44	9.2	B
		TR	0.34	13.8	B	TR	0.73	19.3	C
	WB	L	0.18	8.0	B	L	0.27	9.1	B
		TR	0.86	26.8	D	TR	0.45	14.7	B
Overall Intersection		-	**0.93**	**27.7**	**D**	-	*	*	**F***

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)									
Merrick Avenue	NB	L	0.45	31.0	D	L	0.47	29.3	D
		TR	0.63	33.6	D	TR	0.70	31.9	D
	SB	L	0.50	24.0	C	L	1.01	71.5	F
		T	0.34	22.6	C	T	0.61	23.2	C
		R	0.31	22.4	C	R	0.25	18.9	C
Sunrise Highway (NYS Rt. 27)	EB	L	0.56	37.5	D	L	0.53	33.3	D
		T	0.89	27.0	D	T	0.75	22.7	C
		R	0.03	14.2	B	R	0.09	15.7	C
	WB	L	0.25	33.5	D	L	0.72	38.8	D
		T	1.11	*	F*	T	0.84	25.0	C
		R	0.10	14.7	B	R	0.20	16.4	C
Overall Intersection		-	*	*	F*	-	**0.89**	**27.0**	**D**
BABYLON									
27 Deer Park Avenue & Railroad Avenue[3]									
Deer Park Avenue	NB	L		6.6	B	L		5.6	B
Railroad Avenue	EB	L		47.3	E	L		197.8	F
		R		6.6	B	R		6.1	B
Overall Intersection		-		**6.9**	**B**	-		**32.8**	**D**
28 Deer Park Avenue & Park Avenue									
Deer Park Avenue	NB	LT	0.41	5.4	B	LT	0.71	8.3	B
	SB	TR	1.08	*	F*	TR	1.03	43.1	E
Park Avenue	EB	LR	0.82	17.5	C	LR	0.91	24.5	C
Overall Intersection		-	*	*	F*	-	**0.98**	**26.0**	**D**
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street									
Fire Island Avenue	NB	LTR	0.68	28.6	D	LTR	1.18	*	F*
Deer Park Avenue	SB	D/L	0.72	33.7	D	LTR	1.06	79.8	F
		TR	0.55	25.4	D	-	-	-	-
West Main Street	EB	L	0.54	15.8	C	L	0.81	36.6	D
		TR	0.65	6.5	B	TR	0.78	9.1	B
East Main Street	WB	L	0.15	5.8	B	L	0.25	6.5	B
		TR	0.89	18.5	C	TR	0.88	17.2	C
Overall Intersection		-	**0.85**	**16.7**	**C**	-	*	*	F*
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.50	10.0	B	L	0.59	12.7	B
		TR	0.70	12.5	B	TR	0.23	8.5	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.24	20.8	C	T	0.93	45.0	E
		R	0.10	20.1	C	R	0.41	9.6	B
Long Island Avenue	EB	L	0.29	18.8	C	L	0.34	19.3	C
		T	0.20	18.2	C	T	0.08	17.6	C
		R	0.57	21.9	C	R	0.73	26.2	D
	WB	L	0.34	13.8	B	L	1.04	57.5	E
		T	0.06	11.2	B	T	0.15	11.6	B
		R	0.02	11.0	B	R	0.01	10.9	B
Overall Intersection		-	**0.57**	**14.1**	**B**	-	**0.90**	**28.3**	**D**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	0.50	20.7	C	L	0.92	40.2	E
		LR	0.51	20.8	C	LR	0.92	40.1	E
Pine Aire Drive	EB	L	0.45	10.4	B	L	0.19	10.3	B
		T	0.29	4.4	A	T	0.74	12.0	B
	WB	LT	0.70	17.3	C	LT	0.98	54.8	E
		R	1.23	*	F*	R	0.54	9.9	B
Overall Intersection		-	*	*	F*	-	**0.80**	**27.6**	**D**

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
HUNTINGTON									
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway									
New York Avenue (NYS Rt. 110)	NB	L	0.46	9.8	B	L	0.50	16.7	C
		T	0.54	17.3	C	T	0.67	19.1	C
		R	0.30	15.0	B	R	0.26	14.6	B
	SB	L	0.66	14.6	B	L	1.12	*	F*
		T	0.45	16.3	C	T	0.83	23.4	C
		R	0.17	14.0	B	R	0.22	14.3	B
Railroad Street	EB	L	0.82	62.3	F	L	0.66	34.3	D
		TR	0.84	40.9	E	TR	1.20	*	F*
Broadway	WB	L	0.88	35.8	D	L	0.78	28.2	D
		T	0.76	26.1	D	T	0.40	19.8	C
		R	0.45	20.4	C	R	0.50	21.1	C
Overall Intersection		-	**0.74**	**22.0**	**C**	-	*	*	**F***
33 Park Avenue & Broadway									
Park Avenue	NB	L	1.23	*	F*	L	0.90	34.7	D
		T	0.39	2.5	A	T	0.34	2.4	A
	SB	T	0.53	10.6	B	T	0.54	10.7	B
Broadway	EB	L	0.38	19.9	C	L	1.01	63.1	F
Overall Intersection		-	*	*	**F***	-	**0.73**	**18.3**	**C**
PORT JEFFERSON									
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]									
Main Street	NB	L		6.5	B	L		245.8	F
	SB	L		10.4	C	L		21.2	D
Overall Intersection		-		**0.3**	**A**	-		**7.5**	**B**
35 Main Street (NYS Rt. 25A) & North Country Road									
Main Street (NYS Rt. 25A)	NB	LTR	1.37	*	F*	LTR	2.71	*	F*
	SB	L	0.45	8.8	B	L	1.61	*	F*
		TR	0.38	6.7	B	TR	0.87	20.2	C
Sheep Pasture Road	EB	LTR	0.38	24.2	C	LTR	0.96	49.1	E
North Country Road	WB	L	1.31	*	F*	L	1.66	*	F*
		TR	0.52	19.8	C	TR	0.32	16.5	C
Overall Intersection		-	*	*	**F***	-	*	*	**F***
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.45	10.2	B	TR	0.79	12.6	B
	SB	L	0.92	22.1	C	L	1.01	59.9	E
		T	0.45	3.6	A	T	0.23	2.3	A
Union Avenue	WB	L	0.33	17.0	C	L	0.26	20.2	C
		R	0.42	9.1	B	R	0.63	17.1	C
Overall Intersection		-	**0.73**	**11.7**	**B**	-	**0.90**	**20.1**	**C**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.82	42.4	E	L	0.46	29.8	D
		T	0.37	20.1	C	T	0.37	15.8	C
	SB	TR	0.84	35.3	D	TR	0.61	25.7	D
L.I.E. North Service Road	WB	LTR	1.04	35.4	D	LTR	0.39	13.9	B
Overall Intersection		-	**0.99**	**34.3**	**D**	-	**0.59**	**18.6**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.58	22.8	C	TR	1.05	67.9	F
	SB	L	1.06	99.9	F	L	0.59	27.1	D
		T	0.56	18.6	C	T	0.23	14.2	B
L.I.E. South Service Road	EB	LT	0.30	11.3	B	LT	0.98	27.5	D
Overall Intersection		-	**0.62**	**25.1**	**D**	-	**0.90**	**34.4**	**D**
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.07	12.3	B
		TR	0.01	12.2	B	TR	0.20	12.7	B
Ronkonkoma Avenue Ramp	SB	L	0.22	12.8	B	L	0.26	13.0	B
		TR	0.04	12.2	B	TR	0.05	12.3	B
Railroad Avenue	EB	L	0.09	2.0	A	L	0.06	1.9	A
		T	0.24	2.2	A	T	0.43	2.8	A
		R	0.01	1.9	A	R	0.01	1.9	A
	WB	L	0.01	1.8	A	L	0.01	1.8	A
		TR	0.62	3.9	A	TR	0.36	2.6	A
Overall Intersection		-	**0.52**	**4.2**	**A**	-	**0.39**	**4.3**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE L-3

2010 BUILD
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 3

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	1.08	*	F*	L	0.69	23.8	C
		TR	0.44	8.4	B	TR	0.46	8.6	B
	SB	LTR	0.87	21.2	C	LTR	0.91	25.0	C
North Station Plaza	EB	L	0.29	12.0	B	L	0.30	12.0	B
		TR	0.52	13.7	B	TR	0.65	15.6	C
	WB	L	0.81	32.4	D	L	1.50	*	F*
		TR	0.27	11.8	B	TR	0.24	11.5	B
Overall Intersection		-	*	*	F*	-	*	*	F*
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	1.24	*	F*	L	0.90	45.4	E
		TR	0.50	7.8	B	TR	0.38	7.0	B
	SB	L	0.84	33.1	D	L	0.22	6.3	B
		TR	0.46	7.5	B	TR	0.50	7.8	B
South Station Plaza	EB	DfL	0.91	42.1	E	LTR	0.99	42.1	E
		TR	0.53	15.3	C	-	-	-	-
	WB	L	0.31	13.4	B	L	0.85	47.0	E
		TR	0.52	15.1	C	TR	0.48	14.6	B
Overall Intersection		-	*	*	F*	-	**0.94**	**19.4**	**C**
HEMPSTEAD									
3 Main Street & West Columbia Street									
Main Street	NB	LT	0.31	4.4	A	LT	0.25	4.2	A
		R	0.10	3.7	A	R	0.11	3.7	A
	SB	LTR	0.43	5.2	B	LTR	0.72	9.1	B
West Columbia Street	EB	LTR	0.35	18.5	C	LTR	0.55	20.4	C
	WB	LTR	0.85	34.1	D	LTR	0.86	36.4	D
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.76**	**14.8**	**B**
4 Main Street & Fulton Street (NYS Rt. 24)									
Main Street	NB	TR	0.59	18.1	C	TR	0.48	17.1	C
	SB	TR	0.56	18.5	C	TR	1.02	58.5	E
Fulton Street (NYS Rt.24)	EB	TR	0.57	4.2	A	TR	0.62	4.4	A
	WB	TR	0.43	3.5	A	TR	0.57	4.1	A
Overall Intersection		-	**0.58**	**8.3**	**B**	-	**0.76**	**13.3**	**B**
5 Fulton Street (NYS Rt. 24) & Washington Ave.									
Washington Avenue	NB	L	0.08	11.5	B	L	0.09	13.2	B
		TR	0.94	26.8	D	TR	0.54	14.4	B
	SB	L	0.50	19.4	C	L	0.74	23.4	C
		TR	0.68	16.1	C	TR	0.75	17.4	C
Fulton Street (NYS Rt. 24)	EB	LTR	1.04	41.3	E	LTR	0.98	28.7	D
	WB	LT	1.13	*	F*	LT	1.17	*	F*
		R	0.60	11.7	B	R	0.28	9.1	B
Overall Intersection		-	*	*	F*	-	*	*	F*
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	0.96	57.3	E	L	0.82	33.3	D
		T	0.41	9.9	B	T	0.51	10.7	B
		R	0.08	7.9	B	R	0.06	7.8	B
	SB	L	0.13	13.2	B	L	0.82	47.0	E
		T	0.85	23.1	C	T	0.80	21.1	C
		R	0.49	16.3	C	R	0.25	14.0	B
West John Street	EB	L	0.80	30.3	D	L	1.05	*	F*
		T	0.40	23.9	C	T	0.90	38.0	D
		R	0.43	24.4	C	R	0.55	27.0	D
	WB	L	0.70	21.2	C	L	0.64	21.3	C
		TR	0.85	32.7	D	TR	0.59	26.8	D
Overall Intersection		-	**0.87**	**23.7**	**C**	-	*	*	F*

Table L - 3 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	A.M. V/C	A.M. Avg. Stopped Delay	A.M. LOS	P.M. Peak Hour Mvt.	P.M. V/C	P.M. Avg. Stopped Delay	P.M. LOS
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue									
Newbridge Road (NYS Rt. 106)	NB	L	0.92	44.7	E	L	0.22	14.9	B
		T	0.57	18.0	C	T	0.68	18.8	C
		R	0.06	14.0	B	R	0.08	13.4	B
	SB	L	0.19	9.5	B	L	0.48	13.3	B
		T	0.74	20.8	C	T	1.10	*	F*
		R	1.00	52.7	E	R	0.37	15.5	C
Duffy Avenue	EB	L	0.40	16.6	C	L	1.05	67.7	F
		T	0.12	13.9	B	TR	0.59	17.3	C
		R	0.13	14.0	B	R	0.33	14.4	B
	WB	LTR	0.98	54.2	E	LTR	0.96	61.7	F
Overall Intersection		-	**0.98**	**30.4**	**D**	-	*	*	**F***
8 Broadway (NYS Rt 107) & East John Street									
Broadway (NYS Rt 107)	NB	L	0.83	49.2	E	L	0.65	38.0	D
		TR	0.49	7.9	B	TR	0.52	9.1	B
	SB	L	0.31	12.9	B	L	0.56	22.9	C
		TR	0.35	12.6	B	TR	0.73	19.8	C
East John Street	EB	L	0.35	24.8	C	L	0.25	20.8	C
		T	0.26	29.0	D	T	0.55	29.5	D
		R	0.36	25.4	D	R	0.65	27.0	D
	WB	LTR	0.76	36.1	D	LTR	0.62	30.8	D
Overall Intersection		-	**0.56**	**20.9**	**C**	-	**0.69**	**21.1**	**C**
9 Bay Avenue & East Barclay Street/Woodbury Road									
Bay Avenue	NB	LTR	0.28	20.1	C	LTR	0.34	20.3	C
	SB	L	0.37	17.2	C	L	0.83	27.9	D
		LT	0.41	17.5	C	LT	0.88	33.8	D
East Barclay Street	EB	LTR	0.24	6.7	B	LTR	0.39	7.4	B
Woodbury Road	WB	LT	0.37	7.3	B	LT	0.27	6.8	B
		R	0.47	2.1	A	R	0.31	1.6	A
Overall Intersection		-	**0.44**	**8.3**	**B**	-	**0.50**	**14.5**	**B**
MALVERNE									
10 Hempstead Avenue & Nassau Avenue/Francis Street -- LIRR Entrance									
Hempstead Avenue	NB	LTR	0.95	25.2	D	LTR	0.85	15.7	C
	SB	LTR	0.54	7.4	B	LTR	0.91	20.3	C
Nassau Avenue	EB	LTR	0.18	10.1	B	LTR	0.20	10.2	B
Francis Street - LIRR Entrance	WB	LTR	0.20	10.2	B	LTR	0.38	11.2	B
Overall Intersection		-	**0.65**	**17.2**	**C**	-	**0.70**	**17.1**	**C**
11 Hempstead Avenue & Utterby Road									
Hempstead Avenue	NB	TR	0.90	25.8	D	TR	0.77	17.4	C
	SB	LT	0.57	6.7	B	LT	0.63	7.2	B
Utterby Road	WB	L	0.20	20.2	C	L	0.26	20.4	C
		R	0.77	33.0	D	R	0.62	25.6	D
Overall Intersection		-	**0.50**	**18.0**	**C**	-	**0.52**	**13.1**	**B**
LONG BEACH									
12a LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	L	0.12	14.5	B	L	0.18	14.8	B
West Park Avenue	EB	T	0.43	6.5	B	T	0.51	7.1	B
Overall Intersection		-	**0.32**	**7.2**	**B**	-	**0.39**	**7.8**	**B**
12b LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	TR	0.17	14.8	B	TR	0.18	14.8	B
West Park Avenue	WB	LT	0.45	6.6	B	LT	0.51	7.0	B
Overall Intersection		-	**0.35**	**7.6**	**B**	-	**0.39**	**7.9**	**B**
13 Center Street & West Park Avenue									
Center Street	NB	LT	0.09	14.4	B	LT	0.04	14.2	B
West Park Avenue	WB	TR	0.43	6.5	B	TR	0.50	7.0	B
Overall Intersection		-	**0.31**	**7.1**	**B**	-	**0.34**	**7.2**	**B**

Table L - 3 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
14a Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	TR	0.14	14.6	B	TR	0.11	14.5	B
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B
		T	0.02	14.0	B	T	0.02	14.0	B
West Park Avenue	EB	LTR	0.51	7.0	B	LTR	0.59	7.7	B
Overall Intersection		-	**0.38**	**7.8**	**B**	-	**0.42**	**8.1**	**B**
14b Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	L	0.11	14.5	B	L	0.03	14.1	B
West Park Avenue	WB	LT	0.48	6.9	B	LT	0.55	7.4	B
Overall Intersection		-	**0.35**	**7.8**	**B**	-	**0.37**	**7.5**	**B**
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	1.10	*	F*	LTR	0.97	57.3	E
	SB	LTR	0.62	26.7	D	LTR	0.89	35.0	D
Northern Boulevard (NYS Rt. 25A)	EB	DfL	0.79	36.9	D	-	-	-	-
		T	0.65	5.8	B	LT	0.95	13.5	B
		R	0.19	3.7	A	R	0.25	3.9	A
	WB	L	0.79	22.6	C	L	0.61	10.2	B
		T	0.83	8.3	B	T	0.50	4.9	A
		R	0.17	3.7	A	R	0.18	3.7	A
Overall Intersection		-	*	*	**F***	-	**0.93**	**18.5**	**C**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	1.17	*	F*	LTR	1.13	*	F*
	SB	LTR	0.68	9.3	B	LTR	0.81	12.9	B
41st Avenue	EB	LTR	0.55	12.6	B	LTR	0.60	13.6	B
	WB	LTR	0.37	10.9	B	LTR	0.79	21.9	C
Overall Intersection		-	*	*	**F***	-	*	*	**F***
MINEOLA									
17 Mineola Boulevard & Old Country Boulevard									
Mineola Boulevard	NB	L	0.98	51.2	E	L	0.76	19.5	C
		TR	1.04	52.7	E	TR	1.07	*	F*
	SB	L	0.94	42.4	E	L	0.91	37.3	D
		TR	0.70	18.8	C	TR	0.85	23.1	C
Old Country Road	EB	L	0.70	16.6	C	L	0.71	17.1	C
		TR	1.06	57.4	E	TR	0.91	27.4	D
	WB	L	0.90	36.1	D	L	0.97	50.1	E
		T	0.75	19.8	C	T	0.73	19.4	C
		R	0.55	17.4	C	R	0.74	21.9	C
Overall Intersection		-	**1.00**	**38.9**	**D**	-	*	*	**F***
18 Mineola Boulevard & 2nd Street									
Mineola Boulevard	NB	L	1.09	*	F*	L	0.60	14.1	B
		TR	0.36	4.7	A	TR	0.48	5.9	B
	SB	L	0.14	4.0	A	L	0.92	59.4	E
		TR	0.95	22.1	C	TR	1.06	*	F*
2nd Street	EB	L	0.12	11.0	B	L	0.16	14.7	B
		TR	0.69	16.2	C	TR	0.86	28.9	D
	WB	LTR	1.22	*	F*	LTR	1.06	*	F*
Overall Intersection		-	*	*	**F***	-	*	*	*

Table L - 3 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	A.M. V/C	A.M. Avg. Stopped Delay	A.M. LOS	P.M. Peak Hour Mvt.	P.M. V/C	P.M. Avg. Stopped Delay	P.M. LOS
PORT WASHINGTON									
19 Main Street & LIRR Parking Entrance[3]									
Main Street	WB	L		11.1	C	L		6.4	B
Overall Intersection		-		**0.9**	**A**	-		**0.4**	**A**
20 Main Street & Port Washington Boulevard (NYS Rte. 101)									
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.31	*	*	L	0.99	33.5	D
		TR	0.40	2.7	A	TR	0.36	3.9	A
	SB	L	0.33	9.0	B	L	0.22	10.3	B
		TR	0.54	10.1	B	TR	0.39	10.9	B
Main Street	EB	LT	1.24	*	F*	LT	1.03	76.9	F
		R	0.45	19.0	C	R	0.50	18.2	C
	WB	LTR	0.64	31.9	D	LTR	1.03	78.0	F
Overall Intersection		-	*	*	**F***	-	**0.99**	**25.3**	**D**
VALLEY STREAM									
21 South Franklin Avenue & Merrick Road									
South Franklin Avenue	NB	LTR	0.49	15.3	C	LTR	0.73	21.0	C
	SB	LTR	0.26	13.3	B	LTR	0.27	13.4	B
Merrick Road	EB	TR	0.42	5.3	B	TR	0.53	5.9	B
	WB	LT	0.61	6.8	B	LT	0.98	26.0	D
Overall Intersection		-	**0.57**	**7.7**	**B**	-	**0.90**	**16.0**	**C**
22 South Franklin Avenue & West Hawthorne Avenue									
South Franklin Avenue	NB	LT	0.20	7.2	B	LT	0.30	7.6	B
	SB	TR	0.15	7.0	B	TR	0.25	7.4	B
West Hawthorne Avenue	EB	LR	0.18	10.1	B	LR	0.38	11.3	B
	WB	LTR	0.18	10.1	B	DfL	0.17	10.1	B
						TR	0.17	10.1	B
Overall Intersection		-	**0.19**	**8.2**	**B**	-	**0.34**	**8.6**	**B**
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)									
South Franklin Avenue	NB	LTR	0.46	32.7	D	LTR	0.53	33.6	D
	SB	L	0.81	54.4	E	L	1.00	82.4	F
		R	0.23	30.8	D	R	0.31	31.5	D
Sunrise Highway (NYS Rt. 27)	EB	L	0.29	4.6	A	L	0.49	7.6	B
		T	0.38	4.6	A	T	0.60	6.1	B
	WB	T	0.46	5.1	B	T	0.45	5.0	A
		R	0.08	3.5	A	R	0.08	3.5	A
Overall Intersection		-	**0.54**	**9.4**	**B**	-	**0.69**	**12.1**	**B**
MERRICK									
24 Merrick Avenue & Broadcast Plaza[3]									
Merrick Avenue	NB	L		4.6	A	L		4.6	A
Broadcast Plaza	EB	LR		7.6	B	LR		18.6	C
Overall Intersection		-		**0.9**	**A**	-		**2.0**	**A**
25 Merrick Avenue & Smith Street									
Merrick Avenue	NB	L	0.61	22.9	C	L	0.46	16.8	C
		TR	0.86	25.4	D	TR	1.04	*	F*
	SB	L	0.22	9.5	B	L	0.36	10.8	B
		TR	1.01	44.5	E	TR	0.94	29.3	D
Smith Street	EB	L	0.52	11.2	B	L	0.44	9.2	B
		TR	0.34	13.8	B	TR	0.73	19.3	C
	WB	L	0.18	8.0	B	L	0.27	9.1	B
		TR	0.86	26.8	D	TR	0.45	14.7	B
Overall Intersection		-	**0.93**	**28.6**	**D**	-	*	*	**F***

Table L - 3 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)									
Merrick Avenue	NB	L	0.45	31.1	D	L	0.48	29.9	D
		TR	0.65	34.0	D	TR	0.70	32.1	D
	SB	L	0.52	24.2	C	L	1.01	73.0	F
		T	0.34	22.6	C	T	0.62	23.3	C
		R	0.32	22.4	C	R	0.26	18.9	C
Sunrise Highway (NYS Rt. 27)	EB	L	0.56	37.5	D	L	0.53	33.3	D
		T	0.89	27.0	D	T	0.75	22.7	C
		R	0.03	14.2	B	R	0.09	15.7	C
	WB	L	0.25	33.5	D	L	0.73	39.1	D
		T	1.11	*	F*	T	0.84	25.0	C
		R	0.10	14.7	B	R	0.20	16.4	C
Overall Intersection		-	*	*	F*	-	**0.90**	**27.1**	**D**
BABYLON									
27 Deer Park Avenue & Railroad Avenue[3]									
Deer Park Avenue	NB	L		6.9	B	L		5.7	B
Railroad Avenue	EB	L		60.8	F	L		245.5	F
		R		6.7	B	R		6.2	B
Overall Intersection		-		**8.6**	**B**	-		**42.5**	**E**
28 Deer Park Avenue & Park Avenue									
Deer Park Avenue	NB	LT	0.43	5.5	B	LT	0.73	8.7	B
	SB	TR	1.12	*	F*	TR	1.04	46.4	E
Park Avenue	EB	LR	0.82	17.6	C	LR	0.93	27.7	D
Overall Intersection		-	*	*	F*	-	**1.00**	**28.1**	**D**
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street									
Fire Island Avenue	NB	LTR	0.69	29.0	D	LTR	1.21	*	F*
Deer Park Avenue	SB	DfL	0.74	35.5	D	LTR	1.09	91.5	F
		TR	0.56	25.4	D	-	-	-	-
West Main Street	EB	L	0.54	16.0	C	L	0.81	36.6	D
		TR	0.65	6.5	B	TR	0.78	9.1	B
East Main Street	WB	L	0.15	5.8	B	L	0.25	6.5	B
		TR	0.90	19.3	C	TR	0.88	17.4	C
Overall Intersection		-	**0.86**	**17.2**	**C**	-	*	*	F*
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.54	10.3	B	L	0.60	13.1	B
		TR	0.70	12.5	B	TR	0.23	8.5	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.24	20.8	C	T	0.93	45.0	E
		R	0.10	20.1	C	R	0.41	9.6	B
Long Island Avenue	EB	L	0.29	18.8	C	L	0.34	19.3	C
		T	0.20	18.2	C	T	0.08	17.6	C
		R	0.58	22.2	C	R	0.81	30.1	D
	WB	L	0.34	13.8	B	L	1.04	57.5	E
		T	0.06	11.2	B	T	0.15	11.6	B
		R	0.02	11.0	B	R	0.01	10.9	B
Overall Intersection		-	**0.57**	**14.1**	**B**	-	**0.91**	**28.7**	**D**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	0.51	20.8	C	L	0.95	43.8	E
		LR	0.51	20.9	C	LR	0.95	43.7	E
Pine Aire Drive	EB	L	0.46	10.8	B	L	0.20	10.3	B
		T	0.29	4.4	A	T	0.74	12.0	B
	WB	LT	0.70	17.3	C	LT	0.98	54.8	E
		R	1.25	*	F*	R	0.54	9.9	B
Overall Intersection		-	*	*	F*	-	**0.81**	**29.1**	**D**

Table L - 3 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
HUNTINGTON									
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway									
New York Avenue (NYS Rt. 110)	NB	L	0.46	9.8	B	L	0.50	16.7	C
		T	0.54	17.3	C	T	0.67	19.1	C
		R	0.31	15.0	B	R	0.26	14.6	B
	SB	L	0.69	15.9	C	L	1.12	*	F*
		T	0.45	16.3	C	T	0.83	23.4	C
		R	0.18	14.0	B	R	0.22	14.3	B
Railroad Street	EB	L	0.82	62.3	F	L	0.68	35.0	D
		TR	0.85	41.6	E	TR	1.20	*	F*
Broadway	WB	L	0.89	36.7	D	L	0.79	29.0	D
		T	0.76	26.1	D	T	0.41	19.8	C
		R	0.45	20.4	C	R	0.52	21.3	C
Overall Intersection		-	**0.74**	**22.2**	**C**	-	*	*	**F***
33 Park Avenue & Broadway									
Park Avenue	NB	L	1.26	*	F*	L	0.90	35.0	D
		T	0.39	2.5	A	T	0.34	2.4	A
	SB	T	0.53	10.7	B	T	0.54	10.7	B
Broadway	EB	L	0.38	20.0	C	L	1.05	*	F*
Overall Intersection		-	*	*	**F***	-	*	*	**F***
PORT JEFFERSON									
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]									
Main Street	NB	L		6.5	B	L		245.8	F
	SB	L		10.4	C	L		21.2	D
Overall Intersection		-		**0.3**	**A**	-		**7.5**	**B**
35 Main Street (NYS Rt. 25A) & North Country Road									
Main Street (NYS Rt. 25A)	NB	LTR	1.37	*	F*	LTR	2.71	*	F*
	SB	L	0.45	8.8	B	L	1.61	*	F*
		TR	0.38	6.7	B	TR	0.87	20.2	C
Sheep Pasture Road	EB	LTR	0.38	24.2	C	LTR	0.96	49.1	E
North Country Road	WB	L	1.31	*	F*	L	1.66	*	F*
		TR	0.52	19.8	C	TR	0.32	16.5	C
Overall Intersection		-	*	*	**F***	-	*	*	**F***
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.47	10.3	B	TR	0.88	17.5	C
	SB	L	0.94	24.8	C	L	1.03	64.7	F
		T	0.52	4.0	A	T	0.23	2.3	A
Union Avenue	WB	L	0.36	17.1	C	L	0.26	20.2	C
		R	0.42	9.1	B	R	0.63	17.1	C
Overall Intersection		-	**0.75**	**12.2**	**B**	-	**0.93**	**22.6**	**C**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.82	42.6	E	L	0.46	30.0	D
		T	0.37	20.2	C	T	0.39	16.0	C
	SB	TR	0.90	40.2	E	TR	0.61	25.8	D
L.I.E. North Service Road	WB	LTR	1.05	39.5	D	LTR	0.40	13.9	B
Overall Intersection		-	**1.00**	**38.0**	**D**	-	**0.59**	**18.7**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.58	23.0	C	TR	1.13	*	F*
	SB	L	1.07	106.2	F	L	0.59	27.1	D
		T	0.62	19.4	C	T	0.23	14.2	B
L.I.E. South Service Road	EB	LT	0.30	11.3	B	LT	0.98	28.0	D
Overall Intersection		-	**0.62**	**25.7**	**D**	-	*	*	**F***
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.09	12.4	B
		TR	0.01	12.2	B	TR	0.25	12.9	B
Ronkonkoma Avenue Ramp	SB	L	0.23	12.8	B	L	0.27	13.0	B
		TR	0.04	12.3	B	TR	0.05	12.3	B
Railroad Avenue	EB	L	0.10	2.0	A	L	0.07	1.9	A
		T	0.25	2.3	A	T	0.44	2.8	A
		R	0.02	1.9	A	R	0.01	1.9	A
	WB	L	0.03	1.9	A	L	0.00	1.8	A
		TR	0.64	4.2	A	TR	0.37	2.6	A
Overall Intersection		-	**0.54**	**4.3**	**A**	-	**0.40**	**4.5**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual – TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual – TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE L-4

2010 MITIGATED BUILD
LIRR STATIONS TRAFFIC
AM LEVELS OF SERVICE

Table L - 4
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
GREAT NECK														
1 Middle Neck Road & North Station Plaza														
Middle Neck Road	NB	L	1.03	*	F*	L	[illegible]			L	1.03	68.6	F	- Modify signal timing (shift 1 sec. green
		TR	0.44	8.4	B	TR	0.44	8.4	B	TR	0.44	8.4	B	time from NB/SB phase to exclusive
	SB	LTR	0.74	15.4	C	LTR	0.87	21.2	C	LTR	0.89	23.7	C	NB phase)
North Station Plaza	EB	L	0.26	11.8	B	L	0.29	12.0	B	L	0.29	12.0	B	- Restripe WB approach from one 11 ft.
		TR	0.50	13.5	B	TR	0.52	13.7	B	TR	0.52	13.7	B	left lane and one 16 ft. thru lane to one
	WB	L	0.69	21.5	C	L	[illegible]			L	0.74	24.3	C	14 ft. left lane and one 13 ft. thru lane
		TR	0.25	11.6	B	TR	0.27	11.8	B	TR	0.30	11.9	B	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.89**	**20.9**	**C**	
2 Middle Neck Road & South Station Plaza														
Middle Neck Road	NB	L	1.19	*	F*	L	[illegible]			L	1.20	168.6	F	- Restripe NB approach from one 10 ft.
		TR	0.49	7.7	B	TR	0.50	7.8	B	TR	0.51	7.9	B	left lane and one 12 ft. thru lane to two
	SB	L	0.83	31.4	D	L	0.84	33.1	D	L	0.84	33.1	D	11 ft. lanes
		TR	0.45	7.5	B	TR	0.46	7.5	B	TR	0.46	7.5	B	
South Station Plaza	EB	DfL	0.91	41.4	E	DfL	0.91	42.1	E	DfL	0.91	42.1	E	
		TR	0.52	15.1	C	TR	0.53	15.3	C	TR	0.53	15.3	C	
	WB	L	0.27	13.1	B	L	0.31	13.4	B	L	0.31	13.4	B	
		TR	0.52	15.1	C	TR	0.52	15.1	C	TR	0.52	15.1	C	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**1.08**	**23.1**	**C**	
HEMPSTEAD														
3 Main Street & West Columbia Street														
Main Street	NB	LT	0.31	4.4	A	LT	0.31	4.4	A					- Mitigation not required
		R	0.10	3.7	A	R	0.10	3.7	A					
	SB	LTR	0.43	5.1	B	LTR	0.43	5.2	B					
West Columbia Street	EB	LTR	0.35	18.5	C	LTR	0.35	18.5	C					
	WB	LTR	0.85	34.1	D	LTR	0.85	34.1	D					
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.55**	**13.8**	**B**					
4 Main Street & Fulton Street (NYS Rt. 24)														
Main Street	NB	TR	0.59	18.1	C	TR	0.59	18.1	C					- Mitigation not required
	SB	TR	0.56	18.5	C	TR	0.56	18.5	C					
Fulton Street (NYS Rt 24)	EB	TR	0.57	4.2	A	TR	0.57	4.2	A					
	WB	TR	0.43	3.5	A	TR	0.43	3.5	A					
Overall Intersection		-	**0.58**	**8.3**	**B**	-	**0.58**	**8.3**	**B**					

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
5 Fulton Street (NYS Rt. 24) & Washington Ave.														
Washington Avenue	NB	L	0.08	11.5	B	L	0.08	11.5	B					- Mitigation not required
		TR	0.94	26.1	D	TR	0.94	26.8	D					
	SB	L	0.50	19.3	C	L	0.50	19.4	C					
		TR	0.68	16.1	C	TR	0.68	16.1	C					
Fulton Street (NYS Rt. 24)	EB	LTR	1.04	41.3	E	LTR	1.04	41.3	E					
	WB	LT	1.13	*	F*	LT	1.13	*	F*					
		R	0.59	11.5	B	R	0.60	11.7	B					
Overall Intersection		-	*	*	F*	-	*	*	F*					
HICKSVILLE														
6 Newbridge Road (NYS Rt. 106) & West John Street														
Newbridge Road (NYS Rt. 106)	NB	L	0.96	57.2	E	L	0.96	57.3	E					- Mitigation not required
		T	0.41	9.9	B	T	0.41	9.9	B					
		R	0.08	7.9	B	R	0.08	7.9	B					
	SB	L	0.13	13.2	B	L	0.13	13.2	B					
		T	0.84	22.8	C	T	0.85	23.1	C					
		R	0.49	16.3	C	R	0.49	16.3	C					
West John Street	EB	L	0.80	30.3	D	L	0.80	30.3	D					
		T	0.40	23.9	C	T	0.40	23.9	C					
		R	0.43	24.4	C	R	0.43	24.4	C					
	WB	L	0.69	21.0	C	L	0.70	21.2	C					
		TR	0.85	32.7	D	TR	0.85	32.7	D					
Overall Intersection		-	**0.87**	**23.6**	**C**	-	**0.87**	**23.7**	**C**					
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue														
Newbridge Road (NYS Rt. 106)	NB	L	0.87	37.1	D	L	[redacted]			L	0.87	36.8	D	- Modify signal timing (shift 1 sec. green time from existing actuated NB/SB phase to existing actuated NB/SB left turn phase)
		T	0.56	18.0	C	T	0.57	18.0	C	T	0.58	18.5	C	
		R	0.06	13.9	B	R	0.06	14.0	B	R	0.06	14.4	B	
	SB	L	0.19	9.5	B	L	0.19	9.5	B	L	0.18	9.5	B	
		T	0.73	20.6	C	T	0.74	20.8	C	T	0.76	21.6	C	
		R	1.00	50.5	E	R	1.00	52.7	E	R	1.03	59.5	E	
Duffy Avenue	EB	L	0.39	16.5	C	L	0.40	16.6	C	L	0.40	16.6	C	
		T	0.11	13.9	B	T	0.12	13.9	B	T	0.12	13.9	B	
		R	0.13	14.0	B	R	0.13	14.0	B	R	0.13	14.0	B	
	WB	LTR	0.94	46.7	E	LTR	0.98	54.2	E	LTR	0.98	54.2	E	
Overall Intersection		-	**0.96**	**28.5**	**D**	-	**0.98**	**30.4**	**D**	-	**0.99**	**31.4**	**D**	

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
8 Broadway (NYS Rt 107) & East John Street														
Broadway (NYS Rt 107)	NB	L	0.83	49.2	E	L	0.83	49.2	E					- Mitigation not required
		TR	0.49	7.9	B	TR	0.49	7.9	B					
	SB	L	0.31	12.9	B	L	0.31	12.9	B					
		TR	0.35	12.6	B	TR	0.35	12.6	B					
East John Street	EB	L	0.35	24.8	C	L	0.35	24.8	C					
		T	0.26	29.0	D	T	0.26	29.0	D					
		R	0.36	25.4	D	R	0.36	25.4	D					
	WB	LTR	0.76	36.0	D	LTR	0.76	36.1	D					
Overall Intersection		-	**0.56**	**20.9**	**C**	-	**0.56**	**20.9**	**C**					
9 Bay Avenue & East Barclay Street/Woodbury Road														
Bay Avenue	NB	LTR	0.28	20.1	C	LTR	0.28	20.1	C					- Mitigation not required
	SB	L	0.37	17.2	C	L	0.37	17.2	C					
		LT	0.41	17.5	C	LT	0.41	17.5	C					
East Barclay Street	EB	LTR	0.23	6.7	B	LTR	0.24	6.7	B					
Woodbury Road	WB	LT	0.37	7.3	B	LT	0.37	7.3	B					
		R	0.47	2.1	A	R	0.47	2.1	A					
Overall Intersection		-	**0.44**	**8.3**	**B**	-	**0.44**	**8.3**	**B**					
MALVERNE														
10 Hempstead Avenue & Nassau Avenue/Francis Street -- LIRR Entrance														
Hempstead Avenue	NB	LTR	0.94	25.0	C	LTR	0.95	25.2	D					- Mitigation not required
	SB	LTR	0.53	7.3	B	LTR	0.54	7.4	B					
Nassau Avenue	EB	LTR	0.18	10.1	B	LTR	0.18	10.1	B					
Francis Street - LIRR Entrance	WB	LTR	0.20	10.2	B	LTR	0.20	10.2	B					
Overall Intersection		-	**0.65**	**17.1**	**C**	-	**0.65**	**17.2**	**C**					
11 Hempstead Avenue & Utterby Road														
Hempstead Avenue	NB	TR	0.90	25.8	D	TR	0.90	25.8	D					- Mitigation not required
	SB	LT	0.57	6.7	B	LT	0.57	6.7	B					
Utterby Road	WB	L	0.20	20.2	C	L	0.20	20.2	C					
		R	0.77	33.0	D	R	0.77	33.0	D					
Overall Intersection		-	**0.50**	**18.0**	**C**	-	**0.50**	**18.0**	**C**					
LONG BEACH														
12a LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	L	0.12	14.5	B	L	0.12	14.5	B					- Mitigation not required
West Park Avenue	EB	T	0.43	6.5	B	T	0.43	6.5	B					
Overall Intersection		-	**0.32**	**7.2**	**B**	-	**0.32**	**7.2**	**B**					

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
12b LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	TR	0.17	14.8	B	TR	0.17	14.8	B					- Mitigation not required
West Park Avenue	WB	LT	0.45	6.6	B	LT	0.45	6.6	B					
Overall Intersection		-	**0.35**	**7.6**	**B**	-	**0.35**	**7.6**	**B**					
13 Center Street & West Park Avenue														
Center Street	NB	LT	0.09	14.4	B	LT	0.09	14.4	B					- Mitigation not required
West Park Avenue	WB	TR	0.43	6.5	B	TR	0.43	6.5	B					
Overall Intersection		-	**0.31**	**7.1**	**B**	-	**0.31**	**7.1**	**B**					
14a Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	TR	0.14	14.6	B	TR	0.14	14.6	B					- Mitigation not required
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B					
		T	0.02	14.0	B	T	0.02	14.0	B					
West Park Avenue	EB	LTR	0.51	7.0	B	LTR	0.51	7.0	B					
Overall Intersection		-	**0.38**	**7.8**	**B**	-	**0.38**	**7.8**	**B**					
14b Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	L	0.11	14.5	B	L	0.11	14.5	B					- Mitigation not required
West Park Avenue	WB	LT	0.48	6.9	B	LT	0.48	6.9	B					
Overall Intersection		-	**0.35**	**7.8**	**B**	-	**0.35**	**7.8**	**B**					
BAYSIDE														
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard														
Bell Boulevard	NB	LTR	1.06	*	F*	LTR	[illegible]			LTR	1.03	68.5	F	- Prohibit parking on the NB approach
	SB	LTR	0.60	26.4	D	LTR	0.62	26.7	D	LTR	0.64	27.5	D	- Restripe the EB approach from three
Northern Boulevard (NYS Rt 25A)	EB	DfL	0.70	25.2	D	DfL	[illegible]			DfL	0.74	29.3	D	through lanes with a shared left turn plus
		T	0.65	5.8	B	T	0.65	5.8	B	T	0.64	5.3	B	one right turn lane, to one left turn only lane,
		R	0.19	3.7	A	R	0.19	3.7	A	R	0.19	3.4	A	two through lanes, and one right turn lane
	WB	L	0.79	22.6	C	L	0.79	22.6	C	L	0.76	19.1	C	- Modify signal timing (take 2 sec. green
		T	0.83	8.3	B	T	0.83	8.3	B	T	0.82	7.6	B	from SB only phase and give 1 sec.
		R	0.16	3.6	A	R	0.17	3.7	A	R	0.16	3.3	A	green time to EB/WB phase and 1 sec.
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.76**	**16.5**	**C**	green time to NB/SB phase)

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
16 Bell Boulevard & 41st Avenue														
Bell Boulevard	NB	LTR	1.08	63.7	F	LTR	[redacted]			L	0.40	5.4	B	- Modify signal timing (shift 4 sec. green time from EB/WB phase to NB/SB phase) - Restripe NB approach from one 20' lane to one 11' exclusive left turn lane and one 11' through/right lane by shifting the centerline 2' to the west
		LTR	0.65	8.8	B					TR	0.77	9.8	B	
	SB	LTR	0.53	12.4	B	LTR	0.68	9.3	B	LTR	0.60	6.4	B	
41st Avenue	EB	LTR	0.31	10.5	B	LTR	0.55	12.6	B	LTR	0.67	17.6	C	
	WB					LTR	0.37	10.9	B	LTR	0.48	14.2	B	
Overall Intersection		-	**0.86**	**33.7**	**D**	-	[redacted]			-	**0.74**	**9.7**	**B**	
MINEOLA														
17 Mineola Boulevard & Old Country Boulevard														
Mineola Boulevard	NB	L	0.98	50.2	E	L	0.98	51.2	E					- Mitigation not required
		TR	1.04	52.4	E	TR	1.04	52.7	E					
	SB	L	0.93	41.6	E	L	0.94	42.4	E					
		TR	0.70	18.8	C	TR	0.70	18.8	C					
Old Country Road	EB	L	0.70	16.5	C	L	0.70	16.6	C					
		TR	1.06	57.4	E	TR	1.06	57.4	E					
	WB	L	0.90	36.1	D	L	0.90	36.1	D					
		T	0.74	19.7	C	T	0.75	19.8	C					
		R	0.54	17.4	C	R	0.55	17.4	C					
Overall Intersection		-	**1.00**	**38.7**	**D**	-	**1.00**	**38.9**	**D**					
18 Mineola Boulevard & 2nd Street														
Mineola Boulevard	NB	L	1.08	*	F*	L	1.09	*	F*					- Mitigation not required
		TR	0.36	4.7	A	TR	0.36	4.7	A					
	SB	L	0.14	4.0	A	L	0.14	4.0	A					
		TR	0.95	21.4	C	TR	0.95	22.1	C					
2nd Street	EB	L	0.12	11.0	B	L	0.12	11.0	B					
		TR	0.68	16.1	C	TR	0.69	16.2	C					
	WB	LTR	1.21	*	F*	LTR	1.22	*	F*					
Overall Intersection		-	*	*	F*	-	*	*	F*					
PORT WASHINGTON														
19 Main Street & LIRR Parking Entrance[3]														
Main Street	WB	L		9.2	B	L		11.1	C					- Mitigation not required
Overall Intersection		-		**0.6**	**A**	-		**0.9**	**A**					

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
20 Main Street & Port Washington Boulevard (NYS Rte. 101)														
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.23	*	F*	L	[redacted]			L	1.23	176.3	F	- Modify signal timing (shift 1 sec. green time from pretimed NB/SB phase to existing acuated EB/WB phase; shift 2 sec. green time from NB/SB phase to existing actuated NB only phase)
		TR	0.40	2.7	A	TR	0.40	2.7	A	TR	0.40	3.0	A	
	SB	L	0.33	9.0	B	L	0.33	9.0	B	L	0.35	10.6	B	
		TR	0.53	10.0	B	TR	0.54	10.1	B	TR	0.57	11.9	B	
Main Street	EB	LT	1.20	*	F*	LT	[redacted]			LT	1.19	162.9	F	
		R	0.45	18.9	C	R	0.45	19.0	C	R	0.43	17.3	C	
	WB	LTR	0.62	31.2	D	LTR	0.64	31.9	D	LTR	0.61	30.3	D	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	1.47	46.0	E	
VALLEY STREAM														
21 South Franklin Avenue & Merrick Road														
South Franklin Avenue	NB	LR	0.49	15.3	C	LTR	0.49	15.3	C					- Mitigation not required
	SB	LTR	0.26	13.3	B	LTR	0.26	13.3	B					
Merrick Road	EB	TR	0.42	5.3	B	TR	0.42	5.3	B					
	WB	LT	0.61	6.7	B	LT	0.61	6.8	B					
Overall Intersection		-	0.57	7.7	B	-	0.57	7.7	B					
22 South Franklin Avenue & West Hawthorne Avenue														
South Franklin Avenue	NB	LT	0.19	7.2	B	LT	0.20	7.2	B					- Mitigation not required
	SB	TR	0.15	7.0	B	TR	0.15	7.0	B					
West Hawthorne Avenue	EB	LR	0.18	10.1	B	LR	0.18	10.1	B					
	WB	LTR	0.17	10.1	B	LTR	0.18	10.1	B					
Overall Intersection		-	0.19	8.2	B	-	0.19	8.2	B					
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)														
South Franklin Avenue	NB	LTR	0.45	32.7	D	LTR	0.46	32.7	D					- Mitigation not required
	SB	L	0.78	51.6	E	L	0.81	54.4	E					
		R	0.23	30.8	D	R	0.23	30.8	D					
Sunrise Highway (NYS Rt. 27)	EB	L	0.28	4.5	A	L	0.29	4.6	A					
		T	0.38	4.6	A	T	0.38	4.6	A					
	WB	T	0.46	5.1	B	T	0.46	5.1	B					
		R	0.08	3.5	A	R	0.08	3.5	A					
Overall Intersection		-	0.53	9.3	B	-	0.54	9.4	B					
MERRICK														
24 Merrick Avenue & Broadcast Plaza[3]														
Merrick Avenue	NB	L		4.6	A	L		4.6	A					- Mitigation not required
Broadcast Plaza	EB	LR		7.5	B	LR		7.6	B					
Overall Intersection		-		0.9	A	-		0.9	A					

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
25 Merrick Avenue & Smith Street														
Merrick Avenue	NB	L	0.61	22.9	C	L	0.61	22.9	C					- Mitigation not required
		TR	0.85	25.2	D	TR	0.86	25.4	D					
	SB	L	0.22	9.5	B	L	0.22	9.5	B					
		TR	1.00	41.7	E	TR	1.01	44.5	E					
Smith Street	EB	L	0.52	11.2	B	L	0.52	11.2	B					
		TR	0.34	13.8	B	TR	0.34	13.8	B					
	WB	L	0.18	8.0	B	L	0.18	8.0	B					
		TR	0.86	26.8	D	TR	0.86	26.8	D					
Overall Intersection		-	**0.93**	**27.7**	**D**	-	**0.93**	**28.6**	**D**					
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)														
Merrick Avenue	NB	L	0.45	31.0	D	L	0.45	31.1	D					- Mitigation not required
		TR	0.63	33.6	D	TR	0.65	34.0	D					
	SB	L	0.50	24.0	C	L	0.52	24.2	C					
		T	0.34	22.6	C	T	0.34	22.6	C					
		R	0.31	22.4	C	R	0.32	22.4	C					
Sunrise Highway (NYS Rt. 27)	EB	L	0.56	37.5	D	L	0.56	37.5	D					
		T	0.89	27.0	D	T	0.89	27.0	D					
		R	0.03	14.2	B	R	0.03	14.2	B					
	WB	L	0.25	33.5	D	L	0.25	33.5	D					
		T	1.11	*	F*	T	1.11	*	F*					
		R	0.10	14.7	B	R	0.10	14.7	B					
Overall Intersection		-	*	*	**F***	-	*	*	**F***					
BABYLON														
27 Deer Park Avenue & Railroad Avenue[3]														
Deer Park Avenue	NB	L		6.6	B	L		6.9	B	LT	0.50	4.5	A	- Install a traffic signal
	SB	L		47.3	E					TR	0.74	10.9	B	
Railroad Avenue	EB	R		6.6	B	L		[illegible]		L	0.46	19.5	C	
						R		6.7	B	R	0.50	20.1	C	
Overall Intersection		-		**6.9**	**B**	-		**8.6**	**B**	-	**0.50**	**11.1**	**B**	
28 Deer Park Avenue & Park Avenue														
Deer Park Avenue	NB	LT	0.41	5.4	B	LT	0.43	5.5	B	LT	0.36	5.2	B	- Eliminate four 15 minute parking spaces
	SB	TR	1.08	*	F*	TR	[illegible]			T	0.53	6.2	B	on the SB approach and restripe SB
Park Avenue		LR	0.82	17.5	C					R	0.50	6.1	B	approach from one 13 ft. lane to two
	EB					LR	0.82	17.6	C	LTR	0.82	17.6	C	10 ft. lanes
		-	*	*	F*									
Overall Intersection						-	[illegible]			-	**0.65**	**9.0**	**B**	

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street														
Fire Island Avenue	NB	LTR	0.68	28.6	D	LTR	0.69	29.0	D					- Mitigation not required
Deer Park Avenue	SB	DfL	0.72	33.7	D	DfL	0.74	35.5	D					
		TR	0.55	25.4	D	TR	0.56	25.4	D					
West Main Street	EB	L	0.54	15.8	C	L	0.54	16.0	C					
		TR	0.65	6.5	B	TR	0.65	6.5	B					
East Main Street	WB	L	0.15	5.8	B	L	0.15	5.8	B					
		TR	0.89	18.5	C	TR	0.90	19.3	C					
Overall Intersection		-	**0.85**	**16.7**	**C**	-	**0.86**	**17.2**	**C**					
DEER PARK														
30 Executive Drive & Long Island Avenue														
Executive Drive	NB	L	0.50	10.0	B	L	0.54	10.3	B					- Mitigation not required
		TR	0.70	12.5	B	TR	0.70	12.5	B					
	SB	L	0.01	19.7	C	L	0.01	19.7	C					
		T	0.24	20.8	C	T	0.24	20.8	C					
		R	0.10	20.1	C	R	0.10	20.1	C					
Long Island Avenue	EB	L	0.29	18.8	C	L	0.29	18.8	C					
		T	0.20	18.2	C	T	0.20	18.2	C					
		R	0.57	21.9	C	R	0.58	22.2	C					
	WB	L	0.34	13.8	B	L	0.34	13.8	B					
		T	0.06	11.2	B	T	0.06	11.2	B					
		R	0.02	11.0	B	R	0.02	11.0	B					
Overall Intersection		-	**0.57**	**14.1**	**B**	-	**0.57**	**14.1**	**B**					
31 Executive Drive & Pine Aire Drive														
Executive Drive	SB	L	0.50	20.7	C	L	0.51	20.8	C	L	0.36	17.1	C	- Modify signal timing (shift 5 sec. green time from existing actuated EB only phase to existing actuated SB/WB right turn phase)
		LR	0.51	20.8	C	LR	0.51	20.9	C	LR	0.51	18.5	C	
Pine Aire Drive	EB	L	0.45	10.4	B	L	0.46	10.8	B	L	0.56	13.5	B	
		T	0.29	4.4	A	T	0.29	4.4	A	T	0.31	5.8	B	
	WB	LT	0.70	17.3	C	LT	0.70	17.3	C	LT	0.70	17.3	C	
		R	1.23	*	F*	R	[redacted]			R	1.16	106.1	F	
Overall Intersection		-	*	*	F*	-	[redacted]			-	**0.63**	**55.7**	**E**	

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
HUNTINGTON														
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway														
New York Avenue (NYS Rt. 110)	NB	L	0.46	9.8	B	L	0.46	9.8	B					- Mitigation not required
		T	0.54	17.3	C	T	0.54	17.3	C					
		R	0.30	15.0	B	R	0.31	15.0	B					
	SB	L	0.66	14.6	B	L	0.69	15.9	C					
		T	0.45	16.3	C	T	0.45	16.3	C					
		R	0.17	14.0	B	R	0.18	14.0	B					
Railroad Street	EB	L	0.82	62.3	F	L	0.82	62.3	F					
		TR	0.84	40.9	E	TR	0.85	41.6	E					
Broadway	WB	L	0.88	35.8	D	L	0.89	36.7	D					
		T	0.76	26.1	D	T	0.76	26.1	D					
		R	0.45	20.4	C	R	0.45	20.4	C					
Overall Intersection		-	**0.74**	**22.0**	**C**	-	**0.74**	**22.2**	**C**					
33 Park Avenue & Broadway														
Park Avenue	NB	L	1.23	*	F*	L	[redacted]			L	0.97	41.0	E	- Modify signal timing (shift 5 sec. green time from NB/SB phase to exclusive NB phase)
		T	0.39	2.5	A	T	0.39	2.5	A	T	0.39	2.5	A	
	SB	T	0.53	10.6	B	T	0.53	10.7	B	T	0.65	14.1	B	
Broadway	EB	L	0.38	19.9	C	L	0.38	20.0	C	L	0.39	20.0	C	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.71**	**15.5**	**C**	
PORT JEFFERSON														
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]														
Main Street	NB	L		6.5	B	L		6.5	B					- Mitigation not required
	SB	L		10.4	C	L		10.4	C					
Overall Intersection		-		**0.3**	**A**	-		**0.3**	**A**					
35 Main Street (NYS Rt. 25A) & North Country Road														
Main Street (NYS Rt. 25A)	NB	LTR	1.37	*	F*	LTR	1.37	*	F*					- Mitigation not required
	SB	L	0.45	8.8	B	L	0.45	8.8	B					
		TR	0.38	6.7	B	TR	0.38	6.7	B					
Sheep Pasture Road	EB	LTR	0.38	24.2	C	LTR	0.38	24.2	C					
North Country Road	WB	L	1.31	*	F*	L	1.31	*	F*					
		TR	0.52	19.8	C	TR	0.52	19.8	C					
Overall Intersection		-	*	*	F*	-	*	*	F*					

Table L - 4 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
RONKONKOMA														
36 Hawkins Avenue & Union Avenue														
Hawkins Avenue	NB	TR	0.45	10.2	B	TR	0.47	10.3	B					- Mitigation not required
	SB	L	0.92	22.1	C	L	0.94	24.8	C					
		T	0.45	3.6	A	T	0.52	4.0	A					
Union Avenue	WB	L	0.33	17.0	C	L	0.36	17.1	C					
		R	0.42	9.1	B	R	0.42	9.1	B					
Overall Intersection		-	**0.73**	**11.7**	**B**	-	**0.75**	**12.2**	**B**					
37 Hawkins Avenue & LIE North Service Road														
Hawkins Avenue	NB	L	0.82	42.4	E	L	0.82	42.6	E	L	0.87	49.7	E	- Modify signal timing (shift 1 sec.
		T	0.37	20.1	C	T	0.37	20.2	C	T	0.37	20.2	C	green time from NB only phase to
	SB	TR	0.84	35.3	D	TR	[illegible]	[illegible]	[illegible]	TR	0.86	35.9	D	NB/SB phase)
L.I.E. North Service Road	WB	LTR	1.04	35.4	D	LTR	1.05	39.5	D	LTR	1.05	39.5	D	
Overall Intersection		-	**0.99**	**34.3**	**D**	-	**1.00**	**38.0**	**D**	-	**1.01**	**37.8**	**D**	
38 Hawkins Avenue & LIE South Service Road														
Hawkins Avenue	NB	TR	0.58	22.8	C	TR	0.58	23.0	C					- Mitigation not required
	SB	L	1.06	99.9	F	L	1.07	106.2	F					
		T	0.56	18.6	C	T	0.62	19.4	C					
L.I.E. South Service Road	EB	LT	0.30	11.3	B	LT	0.30	11.3	B					
Overall Intersection		-	**0.62**	**25.1**	**D**	-	**0.62**	**25.7**	**D**					
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue														
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.03	12.2	B					- Mitigation not required
		TR	0.01	12.2	B	TR	0.01	12.2	B					
Ronkonkoma Avenue Ramp	SB	L	0.22	12.8	B	L	0.23	12.8	B					
		TR	0.04	12.2	B	TR	0.04	12.3	B					
Railroad Avenue	EB	L	0.09	2.0	A	L	0.10	2.0	A					
		T	0.24	2.2	A	T	0.25	2.3	A					
		R	0.01	1.9	A	R	0.02	1.9	A					
	WB	L	0.01	1.8	A	L	0.03	1.9	A					
		TR	0.62	3.9	A	TR	0.64	4.2	A					
Overall Intersection		-	**0.52**	**4.2**	**A**	-	**0.54**	**4.3**	**A**					

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

TABLE L-5

2010 MITIGATED BUILD LIRR STATIONS TRAFFIC PM LEVELS OF SERVICE

Table L - 5
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
GREAT NECK														
1 Middle Neck Road & North Station Plaza														
Middle Neck Road	NB	L	0.67	22.2	C	L	0.69	23.8	C	L	0.69	23.8	C	- Modify signal timing (shift 6 sec. green time from existing actuated EB/WB phase to new exclusive lead actuated WB phase)
		TR	0.46	8.6	B	TR	0.46	8.6	B	TR	0.46	8.6	B	
	SB	LTR	0.83	18.6	C	LTR	0.91	25.0	C	LTR	0.91	25.0	C	
North Station Plaza	EB	L	0.27	11.8	B	L	0.30	12.0	B	L	0.31	14.1	B	
		TR	0.64	15.4	C	TR	0.65	15.6	C	TR	0.76	20.4	C	- Restripe WB approach from one 11 ft. left lane and one 16 ft. thru lane to one 14 ft. left lane and one 13 ft. thru lane
	WB	L	1.32	*	F*	L	[illegible]			L	0.92	57.8	E	
		TR	0.21	11.4	B	TR	0.24	11.5	B	TR	0.26	11.7	B	
Overall Intersection		-	**1.09**	**26.2**	**D**	-	*	*	**F***	-	**0.91**	**19.1**	**C**	
2 Middle Neck Road & South Station Plaza														
Middle Neck Road	NB	L	0.87	38.2	D	L	[illegible]			L	0.55	12.9	B	- Modify signal timing (shift 8 sec. green time from NB/SB phase to existing actuated EB/WB phase; shift 10 sec. green time from NB/SB phase to new actuated left turn phse for NB/SB left turns)
		TR	0.38	7.0	B	TR	0.38	7.0	B	TR	0.61	15.6	C	
	SB	L	0.22	6.3	B	L	0.22	6.3	B	L	0.24	9.2	B	
		TR	0.49	7.7	B	TR	0.50	7.8	B	TR	0.76	18.2	C	
South Station Plaza	EB	LTR	0.98	39.0	D	LTR	[illegible]			LTR	0.82	18.0	C	
		-			-	-	-	-	-	-			-	
	WB	L	0.76	33.8	D	L	[illegible]			L	0.80	35.4	D	- Restripe NB approach from one 10 ft. left lane and one 12 ft. thru lane to two 11 ft. lanes
		TR	0.47	14.5	B	TR	0.48	14.6	B	TR	0.38	10.6	B	
Overall Intersection		-	**0.91**	**17.9**	**C**	-	**0.94**	**19.4**	**C**	-	**0.80**	**17.0**	**C**	
HEMPSTEAD														
3 Main Street & West Columbia Street														
Main Street	NB	LT	0.25	4.2	A	LT	0.25	4.2	A					- Mitigation not required
		R	0.11	3.7	A	R	0.11	3.7	A					
	SB	LTR	0.72	9.0	B	LTR	0.72	9.1	B					
West Columbia Street	EB	LTR	0.55	20.4	C	LTR	0.55	20.4	C					
	WB	LTR	0.86	36.4	D	LTR	0.86	36.4	D					
Overall Intersection		-	**0.76**	**14.8**	**B**	-	**0.76**	**14.8**	**B**					
4 Main Street & Fulton Street (NYS Rt. 24)														
Main Street	NB	TR	0.48	17.1	C	TR	0.48	17.1	C					- Mitigation not required
	SB	TR	1.02	58.5	E	TR	1.02	58.5	E					
Fulton Street (NYS Rt 24)	EB	TR	0.62	4.4	A	TR	0.62	4.4	A					
	WB	TR	0.57	4.1	A	TR	0.57	4.1	A					
Overall Intersection		-	**0.76**	**13.3**	**B**	-	**0.76**	**13.3**	**B**					

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
5 Fulton Street (NYS Rt. 24) & Washington Ave.														
Washington Avenue	NB	L	0.09	13.2	B	L	0.09	13.2	B					- Mitigation not required
		TR	0.53	14.4	B	TR	0.54	14.4	B					
	SB	L	0.74	23.2	C	L	0.74	23.4	C					
		TR	0.75	17.3	C	TR	0.75	17.4	C					
Fulton Street (NYS Rt. 24)	EB	LTR	0.98	28.7	D	LTR	0.98	28.7	D					
	WB	LT	1.17	*	F*	LT	1.17	*	F*					
		R	0.27	9.1	B	R	0.28	9.1	B					
Overall Intersection		-	*	*	F*	-	*	*	F*					
HICKSVILLE														
6 Newbridge Road (NYS Rt. 106) & West John Street														
Newbridge Road (NYS Rt. 106)	NB	L	0.82	33.3	D	L	0.82	33.3	D					- Mitigation not required
		T	0.51	10.7	B	T	0.51	10.7	B					
		R	0.06	7.8	B	R	0.06	7.8	B					
	SB	L	0.81	46.1	E	L	0.82	47.0	E					
		T	0.80	21.1	C	T	0.80	21.1	C					
		R	0.25	14.0	B	R	0.25	14.0	B					
West John Street	EB	L	1.04	*	F*	L	1.05	*	F*					
		T	0.90	37.9	D	T	0.90	38.0	D					
		R	0.55	27.0	D	R	0.55	27.0	D					
	WB	L	0.64	21.3	C	L	0.64	21.3	C					
		TR	0.59	26.8	D	TR	0.59	26.8	D					
Overall Intersection		-	*	*	F*	-	*	*	F*					
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue														
Newbridge Road (NYS Rt. 106)	NB	L	0.21	14.9	B	L	0.22	14.9	B	L	0.25	15.6	C	- Modify signal timing (shift 2 sec.
		T	0.68	18.8	C	T	0.68	18.8	C	T	0.68	18.8	C	green time from existing actuated NB/SB
		R	0.08	13.4	B	R	0.08	13.4	B	R	0.08	13.4	B	left turn phase to existing actuated
	SB	L	0.48	13.3	B	L	0.48	13.3	B	L	0.56	15.5	C	EB/WB phase)
		T	1.09	*	F*	T	1.10	*	F*	T	1.10	77.3	F	
		R	0.37	15.5	C	R	0.37	15.5	C	R	0.37	15.5	C	
Duffy Avenue	EB	L	1.01	58.1	E	L	[illegible]			L	1.01	54.3	E	
		TR	0.57	17.0	C	TR	0.59	17.3	C	TR	0.57	16.1	C	
		R	0.33	14.4	B	R	0.33	14.4	B	R	0.32	13.5	B	
	WB	LTR	0.86	43.8	E	LTR	[illegible]			LTR	0.89	46.8	E	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	1.03	45.1	E	

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
8 Broadway (NYS Rt 107) & East John Street														
Broadway (NYS Rt 107)	NB	L	0.65	38.0	D	L	0.65	38.0	D					- Mitigation not required
		TR	0.51	9.1	B	TR	0.52	9.1	B					
	SB	L	0.56	22.9	C	L	0.56	22.9	C					
		TR	0.73	19.8	C	TR	0.73	19.8	C					
East John Street	EB	L	0.25	20.8	C	L	0.25	20.8	C					
		T	0.55	29.5	D	T	0.55	29.5	D					
		R	0.65	27.0	D	R	0.65	27.0	D					
	WB	LTR	0.62	30.7	D	LTR	0.62	30.8	D					
Overall Intersection		-	**0.69**	**21.0**	**C**	-	**0.69**	**21.1**	**C**					
9 Bay Avenue & East Barclay Street/Woodbury Road														
Bay Avenue	NB	LTR	0.34	20.3	C	LTR	0.34	20.3	C					- Mitigation not required
	SB	L	0.83	27.9	D	L	0.83	27.9	D					
		LT	0.88	33.5	D	LT	0.88	33.8	D					
East Barclay Street	EB	LTR	0.38	7.3	B	LTR	0.39	7.4	B					
Woodbury Road	WB	LT	0.26	6.8	B	LT	0.27	6.8	B					
		R	0.31	1.6	A	R	0.31	1.6	A					
Overall Intersection		-	**0.50**	**14.5**	**B**	-	**0.50**	**14.5**	**B**					
MALVERNE														
10 Hempstead Avenue & Nassau Avenue/Francis Street -- LIRR Entrance														
Hempstead Avenue	NB	LTR	0.85	15.7	C	LTR	0.85	15.7	C					- Mitigation not required
	SB	LTR	0.91	20.3	C	LTR	0.91	20.3	C					
Nassau Avenue	EB	LTR	0.20	10.2	B	LTR	0.20	10.2	B					
Francis Street - LIRR Entrance	WB	LTR	0.38	11.2	B	LTR	0.38	11.2	B					
Overall Intersection		-	**0.70**	**17.1**	**C**	-	**0.70**	**17.1**	**C**					
11 Hempstead Avenue & Utterby Road														
Hempstead Avenue	NB	TR	0.77	17.4	C	TR	0.77	17.4	C					- Mitigation not required
	SB	LT	0.63	7.2	B	LT	0.63	7.2	B					
Utterby Road	WB	L	0.26	20.4	C	L	0.26	20.4	C					
		R	0.62	25.6	D	R	0.62	25.6	D					
Overall Intersection		-	**0.52**	**13.1**	**B**	-	**0.52**	**13.1**	**B**					
LONG BEACH														
12a LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	L	0.17	14.8	B	L	0.18	14.8	B					- Mitigation not required
West Park Avenue	EB	T	0.51	7.1	B	T	0.51	7.1	B					
Overall Intersection		-	**0.39**	**7.8**	**B**	-	**0.39**	**7.8**	**B**					

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
12b LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	TR	0.17	14.8	B	TR	0.18	14.8	B					- Mitigation not required
West Park Avenue	WB	LT	0.51	7.0	B	LT	0.51	7.0	B					
Overall Intersection		-	**0.39**	**7.9**	**B**	-	**0.39**	**7.9**	**B**					
13 Center Street & West Park Avenue														
Center Street	NB	LT	0.04	14.2	B	LT	0.04	14.2	B					- Mitigation not required
West Park Avenue	WB	TR	0.50	7.0	B	TR	0.50	7.0	B					
Overall Intersection		-	**0.34**	**7.2**	**B**	-	**0.34**	**7.2**	**B**					
14a Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	TR	0.11	14.5	B	TR	0.11	14.5	B					- Mitigation not required
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B					
		T	0.02	14.0	B	T	0.02	14.0	B					
West Park Avenue	EB	LTR	0.59	7.7	B	LTR	0.59	7.7	B					
Overall Intersection		-	**0.42**	**8.1**	**B**	-	**0.42**	**8.1**	**B**					
14b Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	L	0.03	14.1	B	L	0.03	14.1	B					- Mitigation not required
West Park Avenue	WB	LT	0.55	7.4	B	LT	0.55	7.4	B					
Overall Intersection		-	**0.37**	**7.5**	**B**	-	**0.37**	**7.5**	**B**					
BAYSIDE														
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard														
Bell Boulevard	NB	LTR	0.95	53.9	E	LTR	0.97	57.3	E	LTR	0.97	57.3	E	- As a result of mitigation required for AM,
	SB	LTR	0.85	32.7	D	LTR	0.89	35.0	D	LTR	0.89	35.0	D	restripe the EB approach from three
Northern Boulevard (NYS Rt. 25A)	EB	-	-	-	-	-	-	-	-	L	0.77	21.5	C	through lanes with a shared left turn plus
		LT	0.94	13.3	B	LT	0.95	13.5	B	T	0.93	19.0	C	one right turn lane, to one left turn only lane,
		R	0.25	3.9	A	R	0.25	3.9	A	R	0.30	8.4	B	two through lanes, and one right turn lane
	WB	L	0.61	10.2	B	L	0.61	10.2	B	L	0.40	9.0	B	- Modify signal timing (shift 11 sec. green
		T	0.50	4.9	A	T	0.50	4.9	A	T	0.59	10.6	B	time from EB/WB phase to a new EB/WB
		R	0.18	3.7	A	R	0.18	3.7	A	R	0.21	8.0	B	left turn only phase)
Overall Intersection		-	**0.91**	**17.5**	**C**	-	**0.93**	**18.5**	**C**	-	**0.92**	**22.5**	**C**	

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
16 Bell Boulevard & 41st Avenue														
Bell Boulevard	NB	LTR	1.07	59.5	E	LTR	[redacted]			L	0.41	7.4	B	- Restripe NB approach from one 20' lane
										TR	0.87	16.4	C	to one 11' exclusive left turn lane and one
	SB	LTR	0.78	11.8	B	LTR	0.81	12.9	B	LTR	0.83	14.2	B	11' through/right lane by shifting the
41st Avenue	EB	LTR	0.54	12.6	B	LTR	0.60	13.6	B	LTR	0.60	13.6	B	centerline 2' to the west
	WB	LTR	0.62	14.2	B	LTR	0.79	21.9	C	LTR	0.79	21.9	C	
Overall Intersection		-	**0.89**	**31.3**	**D**	-	[redacted]			-	**0.84**	**15.7**	**C**	
MINEOLA														
17 Mineola Boulevard & Old Country Boulevard														
Mineola Boulevard	NB	L	0.76	19.5	C	L	0.76	19.5	C					- Mitigation not required
		TR	1.07	*	F*	TR	1.07	*	F*					
	SB	L	0.91	36.7	D	L	0.91	37.3	D					
		TR	0.85	23.0	C	TR	0.85	23.1	C					
Old Country Road	EB	L	0.71	17.1	C	L	0.71	17.1	C					
		TR	0.91	27.4	D	TR	0.91	27.4	D					
	WB	L	0.97	50.1	E	L	0.97	50.1	E					
		T	0.73	19.4	C	T	0.73	19.4	C					
		R	0.74	21.8	C	R	0.74	21.9	C					
Overall Intersection		-	*	*	F*	-	*	*	F*					
18 Mineola Boulevard & 2nd Street														
Mineola Boulevard	NB	L	0.60	14.0	B	TR	0.60	14.1	B					- Mitigation not required
		TR	0.48	5.9	B	L	0.48	5.9	B					
	SB	L	0.92	59.4	E	TR	0.92	59.4	E					
		TR	1.06	*	F*	L	1.06	*	F*					
2nd Street	EB	L	0.16	14.7	B	TR	0.16	14.7	B					
		TR	0.85	28.8	D	LTR	0.86	28.9	D					
	WB	LTR	1.06	*	F*	0.00	1.06	*	F*					
Overall Intersection		-	*	*	F*	-	*	*	F*					
PORT WASHINGTON														
19 Main Street & LIRR Parking Entrance[3]														
Main Street	WB	L		6.0	B	L		6.4	B					- Mitigation not required
Overall Intersection		-		**0.3**	**A**	-		**0.4**	**A**					

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
20 Main Street & Port Washington Boulevard (NYS Rte. 101)														
Port Washington Boulevard (NYS Rt. 101)	NB	L	0.96	27.0	D	L	0.99	33.5	D	L	0.98	31.6	D	- Modify signal timing (shift 1 sec. green time from pretimed NB/SB phase to existing actuated EB/WB phase)
		TR	0.36	3.9	A	TR	0.36	3.9	A	TR	0.36	4.3	A	
	SB	L	0.22	9.9	B	L	0.27	10.3	B	L	0.28	10.8	B	
		TR	0.38	10.9	B	TR	0.38	10.9	B	TR	0.39	11.4	B	
Main Street	EB	LT	0.99	67.5	F	LT	1.03	76.9	F	LT	1.00	68.4	F	
		R	0.50	18.2	C	R	0.50	18.2	C	R	0.49	17.6	C	
	WB	LTR	0.99	67.8	F	LTR	[illegible]			LTR	0.98	64.5	F	
Overall Intersection		-	**0.95**	**22.5**	**C**	-	**0.99**	**25.3**	**D**	-	**0.98**	**23.2**	**C**	
VALLEY STREAM														
21 South Franklin Avenue & Merrick Road														
South Franklin Avenue	NB	LR	0.72	20.7	C	LTR	0.73	21.0	C	LTR	0.77	23.6	C	- Modify signal timing (shift 1 sec. green time from existing actuated NB/SB phase to existing actuated EB/WB phase)
	SB	LTR	0.27	13.3	B	LTR	0.27	13.4	B	LTR	0.28	13.8	B	
Merrick Road	EB	TR	0.53	5.9	B	TR	0.53	5.9	B	TR	0.52	5.6	B	
	WB	LT	0.98	24.7	C	LT	[illegible]			LT	0.96	21.8	C	
Overall Intersection		-	**0.89**	**15.4**	**C**	-	**0.90**	**16.0**	**C**	-	**0.90**	**14.4**	**B**	
22 South Franklin Avenue & West Hawthorne Avenue														
South Franklin Avenue	NB	LT	0.29	7.6	B	LT	0.30	7.6	B					- Mitigation not required
	SB	TR	0.25	7.4	B	TR	0.25	7.4	B					
West Hawthorne Avenue	EB	LR	0.38	11.3	B	LR	0.38	11.3	B					
	WB	DfL	0.17	10.1	B	DfL	0.17	10.1	B					
		TR	0.17	10.1	B	TR	0.17	10.1	B					
Overall Intersection		-	**0.33**	**8.6**	**B**	-	**0.34**	**8.6**	**B**					
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)														
South Franklin Avenue	NB	LTR	0.53	33.6	D	L	0.53	33.6	D					- Mitigation not required
	SB	L	0.99	79.9	F	R	1.00	82.4	F					
		R	0.31	31.4	D	L	0.31	31.5	D					
Sunrise Highway (NYS Rt. 27)	EB	L	0.49	7.6	B	T	0.49	7.6	B					
		T	0.60	6.1	B	T	0.60	6.1	B					
	WB	T	0.45	5.0	A	R	0.45	5.0	A					
		R	0.07	3.5	A	0.00	0.08	3.5	A					
Overall Intersection		-	**0.69**	**12.0**	**B**	-	**0.69**	**12.1**	**B**					
MERRICK														
24 Merrick Avenue & Broadcast Plaza[3]														
Merrick Avenue	NB	L		4.6	A	L		4.6	A					- Mitigation not required
Broadcast Plaza	EB	LR		17.6	C	LR		18.6	C					
Overall Intersection		-		**1.9**	**A**	-		**2.0**	**A**					

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
25 Merrick Avenue & Smith Street														
Merrick Avenue	NB	L	0.46	16.8	C	L	0.46	16.8	C	L	0.46	16.3	C	- Modify signal timing (shift 1 sec. green time from existing actuated EB/WB phase to existing actuated NB/SB phase)
		TR	1.03	*	F*	TR	[redacted]			TR	1.00	45.6	E	
	SB	L	0.36	10.8	B	L	0.36	10.8	B	L	0.36	10.6	B	
		TR	0.94	28.8	D	TR	0.94	29.3	D	TR	0.92	25.2	D	
Smith Street	EB	L	0.44	9.2	B	L	0.44	9.2	B	L	0.45	9.7	B	
		TR	0.73	19.3	C	TR	0.73	19.3	C	TR	0.76	21.0	C	
	WB	L	0.27	9.1	B	L	0.27	9.1	B	L	0.27	9.5	B	
		TR	0.45	14.7	B	TR	0.45	14.7	B	TR	0.47	15.3	C	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.87**	**26.5**	**D**	
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)														
Merrick Avenue	NB	L	0.47	29.3	D	L	0.48	29.9	D					- Mitigation not required
		TR	0.70	31.9	D	TR	0.70	32.1	D					
	SB	L	1.01	71.5	F	L	1.01	73.0	F					
		T	0.61	23.2	C	T	0.62	23.3	C					
		R	0.25	18.9	C	R	0.26	18.9	C					
Sunrise Highway (NYS Rt. 27)	EB	L	0.53	33.3	D	L	0.53	33.3	D					
		T	0.75	22.7	C	T	0.75	22.7	C					
		R	0.09	15.7	C	R	0.09	15.7	C					
	WB	L	0.72	38.8	D	L	0.73	39.1	D					
		T	0.84	25.0	C	T	0.84	25.0	C					
		R	0.20	16.4	C	R	0.20	16.4	C					
Overall Intersection		-	**0.89**	**27.0**	**D**	-	**0.90**	**27.1**	**D**					
BABYLON														
27 Deer Park Avenue & Railroad Avenue[3]														
Deer Park Avenue	NB	L		5.6	B	L		5.7	B	LT	0.44	4.1	A	- Install a traffic signal
	SB	L		197.8	F					TR	0.69	9.8	B	
Railroad Avenue	EB	R		6.1	B	L	[redacted]			L	0.67	23.1	C	
						R		6.2	B	R	0.40	19.0	C	
Overall Intersection		-		**32.8**	**D**	-	[redacted]			-	**0.5**	**11.2**	**B**	
28 Deer Park Avenue & Park Avenue														
Deer Park Avenue	NB	LT	0.71	8.3	B	LT	0.73	8.7	B	LT	0.66	7.7	B	- Eliminate parking on the SB approach and restripe SB approach from one 13 ft. lane to two 10 ft. lanes
	SB	TR	1.03	43.1	E	TR	1.04	46.4	E	T	0.59	7.1	B	
		LR	0.91	24.5	C					R	0.38	5.7	B	
Park Avenue	EB					LR	[redacted]			LR	0.89	22.0	C	- Modify signal timing (shift 1 sec. green time from NB/SB phase to actuated EB phase)
Overall Intersection		-	**0.98**	**26.0**	**D**	-	**1.00**	**28.1**	**D**	-	**0.76**	**11.2**	**B**	

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street														
Fire Island Avenue	NB	LTR	1.18	*	F*	LTR	[illegible]			LTR	1.13	127.3	F	- Modify signal timing (shift 1 sec. green time from pretimed EB/WB phase to existing actuated NB/SB phase)
Deer Park Avenue	SB	LTR	1.06	79.8	F	LTR				LTR	1.04	70.7	F	
		-	-	-	-	-	-	-	-	-			-	
West Main Street	EB	L	0.81	36.6	D	L	0.81	36.6	D	L	0.81	36.6	D	
		TR	0.78	9.1	B	TR	0.78	9.1	B	TR	0.79	9.7	B	
East Main Street	WB	L	0.25	6.5	B	L	0.25	6.5	B	L	0.26	6.9	B	
		TR	0.88	17.2	C	TR	0.88	17.4	C	TR	0.90	18.8	C	
Overall Intersection		-	*	*	F*	-	[illegible]			-	0.97	34.0	D	
DEER PARK														
30 Executive Drive & Long Island Avenue														
Executive Drive	NB	L	0.59	12.7	B	L	0.60	13.1	B					- Mitigation not required
		TR	0.23	8.5	B	TR	0.23	8.5	B					
	SB	L	0.01	19.7	C	L	0.01	19.7	C					
		T	0.93	45.0	E	T	0.93	45.0	E					
		R	0.41	9.6	B	R	0.41	9.6	B					
Long Island Avenue	EB	L	0.34	19.3	C	L	0.34	19.3	C					
		T	0.08	17.6	C	T	0.08	17.6	C					
		R	0.73	26.2	D	R	0.81	30.1	D					
	WB	L	1.04	57.5	E	L	1.04	57.5	E					
		T	0.15	11.6	B	T	0.15	11.6	B					
		R	0.01	10.9	B	R	0.01	10.9	B					
Overall Intersection		-	**0.90**	**28.3**	D	-	**0.91**	**28.7**	D					
31 Executive Drive & Pine Aire Drive														
Executive Drive	SB	L	0.92	40.2	E	L	0.95	43.8	E					- Mitigation not required
		LR	0.92	40.1	E	LR	0.95	43.7	E					
Pine Aire Drive	EB	L	0.19	10.3	B	L	0.20	10.3	B					
		T	0.74	12.0	B	T	0.74	12.0	B					
	WB	LT	0.98	54.8	E	LT	0.98	54.8	E					
		R	0.54	9.9	B	R	0.54	9.9	B					
Overall Intersection		-	**0.80**	**27.6**	D	-	**0.81**	**29.1**	D					

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
HUNTINGTON														
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway														
New York Avenue (NYS Rt. 110)	NB	L	0.50	16.7	C	L	0.50	16.7	C					- Mitigation not required
		T	0.67	19.1	C	T	0.67	19.1	C					
		R	0.26	14.6	B	R	0.26	14.6	B					
	SB	L	1.12	*	F*	L	1.12	*	F*					
		T	0.83	23.4	C	T	0.83	23.4	C					
		R	0.22	14.3	B	R	0.22	14.3	B					
Railroad Street	EB	L	0.66	34.3	D	L	0.68	35.0	D					
		TR	1.20	*	F*	TR	1.20	*	F*					
Broadway	WB	L	0.78	28.2	D	L	0.79	29.0	D					
		T	0.40	19.8	C	T	0.41	19.8	C					
		R	0.50	21.1	C	R	0.52	21.3	C					
Overall Intersection		-	*	*	F*	-	*	*	F*					
33 Park Avenue & Broadway														
Park Avenue	NB	L	0.90	34.7	D	L	0.90	35.0	D	L	0.90	35.0	D	- Modify signal timing (shift 1 sec. green time from NB/SB phase to EB phase)
		T	0.34	2.4	A	T	0.34	2.4	A	T	0.35	2.7	A	
	SB	T	0.54	10.7	B	T	0.54	10.7	B	T	0.56	11.3	B	
Broadway	EB	L	1.01	63.1	F	L	[illegible]			L	0.97	50.8	E	
Overall Intersection		-	**0.73**	**18.3**	**C**	-	*	*	F*	-	**0.74**	**17.2**	**C**	
PORT JEFFERSON														
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]														
Main Street	NB	L		245.8	F	L		245.8	F					- Mitigation not required
	SB	L		21.2	D	L		21.2	D					
Overall Intersection		-		**7.5**	**B**	-		**7.5**	**B**					
35 Main Street (NYS Rt. 25A) & North Country Road														
Main Street (NYS Rt. 25A)	NB	LTR	2.71	*	F*	LTR	2.71	*	F*					- Mitigation not required
	SB	L	1.61	*	F*	L	1.61	*	F*					
		TR	0.87	20.2	C	TR	0.87	20.2	C					
Sheep Pasture Road	EB	LTR	0.96	49.1	E	LTR	0.96	49.1	E					
North Country Road	WB	L	1.66	*	F*	L	1.66	*	F*					
		TR	0.32	16.5	C	TR	0.32	16.5	C					
Overall Intersection		-	*	*	F*	-	*	*	F*					

Table L - 5 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
RONKONKOMA														
36 Hawkins Avenue & Union Avenue														
Hawkins Avenue	NB	TR	0.79	12.6	B	TR	0.88	17.5	C	TR	0.88	17.5	C	- Modify signal timing (shift 1 sec. green
	SB	L	1.01	59.9	E	L	[illegible]			L	0.97	47.2	E	time from acuated WB phase to exclusive
		T	0.23	2.3	A	T	0.23	2.3	A	T	0.23	2.1	A	actuated SB phase)
Union Avenue	WB	L	0.26	20.2	C	L	0.26	20.2	C	L	0.28	20.8	C	
		R	0.63	17.1	C	R	0.63	17.1	C	R	0.63	17.1	C	
	Overall Intersection	-	**0.90**	**20.1**	**C**	-	**0.93**	**22.6**	**C**	-	**0.78**	**19.8**	**C**	
37 Hawkins Avenue & LIE North Service Road														
Hawkins Avenue	NB	L	0.46	29.8	D	L	0.46	30.0	D	L	0.47	29.6	D	- Signal timing modified to coordinate
		T	0.37	15.8	C	T	0.39	16.0	C	T	0.38	15.5	C	with intersection of Hawkins Avenue with
	SB	TR	0.61	25.7	D	TR	0.61	25.8	D	TR	0.58	24.3	C	LIE South Service Road
L.I.E. North Service Road	WB	LTR	0.39	13.9	B	LTR	0.40	13.9	B	LTR	0.40	14.4	B	
	Overall Intersection	-	**0.59**	**18.6**	**C**	-	**0.59**	**18.7**	**C**	-	**0.60**	**18.3**	**C**	
38 Hawkins Avenue & LIE South Service Road														
Hawkins Avenue	NB	TR	1.05	67.9	F	TR	[illegible]			TR	1.04	63.1	F	- Modify signal timing (shift 1 sec. green
	SB	L	0.59	27.1	D	L	0.59	27.1	D	L	0.62	28.2	D	time from EB phase to NB/SB phase;
		T	0.23	14.2	B	T	0.23	14.2	B	T	0.23	13.7	B	shift 1 sec. green time from exclusive
L I E South Service Road	EB	LT	0.98	27.5	D	LT	0.98	28.0	D	LT	1.00	32.4	D	SB phase to NB/SB phase)
	Overall Intersection	-	**0.90**	**34.4**	**D**	-	[illegible]			-	**0.92**	**37.0**	**D**	
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue														
LIRR Parking Lot	NB	L	0.07	12.3	B	L	0.09	12.4	B					- Mitigation not required
		TR	0.20	12.7	B	TR	0.25	12.9	B					
Ronkonkoma Avenue Ramp	SB	L	0.26	13.0	B	L	0.27	13.0	B					
		TR	0.05	12.3	B	TR	0.05	12.3	B					
Railroad Avenue	EB	L	0.06	1.9	A	L	0.07	1.9	A					
		T	0.43	2.8	A	T	0.44	2.8	A					
		R	0.01	1.9	A	R	0.01	1.9	A					
	WB	L	0.01	1.8	A	L	0.00	1.8	A					
		TR	0.36	2.6	A	TR	0.37	2.6	A					
	Overall Intersection	-	**0.39**	**4.3**	**A**	-	**0.40**	**4.5**	**A**					

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

Appendix C: Noise and Vibration

APPENDIX C-1

NOISE MONITORING DATA

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq-30.0B	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	69.40	69.40	8709635.9	89.9	79.3	72.1	61.5	55.9
9:00 AM	68.90	68.90	7762471.166	90.1	78.7	72.1	61.1	55.9
10:00 AM	66.40	66.40	4365158.322	88.3	76.3	68.9	58.1	53.5
11:00 AM	66.20	66.20	4168693.835	88.3	76.3	68.1	55.7	52.3
12:00 PM	64.80	64.80	3019951.72	85.5	76.1	66.9	54.7	50.9
1:00 PM	65.80	65.80	3801893.963	86.3	77.7	68.1	56.9	51.9
2:00 PM	66.70	66.70	4677351.413	89.9	77.3	68.1	56.9	52.9
3:00 PM	65.30	65.30	3388441.561	80.9	75.9	68.7	57.7	52.7
4:00 PM	67.60	67.60	5754399.373	89.9	78.1	69.7	58.7	53.1
5:00 PM	66.70	66.70	4677351.413	84.7	77.3	70.7	58.7	54.5
6:00 PM	70.30	70.30	10715193.05	92.9	78.1	71.1	60.9	55.9
7:00 PM	67.00	67.00	5011872.336	84.5	76.9	70.9	59.7	53.5
8:00 PM	65.40	65.40	3467368.505	83.1	76.3	69.1	56.3	52.1
9:00 PM	63.90	63.90	2454708.916	82.7	74.9	66.5	56.1	52.7
10:00 PM	63.50	63.50	2238721.139	83.3	74.7	65.5	54.7	51.7
11:00 PM	62.20	[illegible]	16595869.07	79.9	73.9	64.7	54.1	51.7
12:00 AM	61.70	[illegible]	14791083.88	82.1	73.5	62.3	52.7	50.5
1:00 AM	63.30	[illegible]	21379620.9	88.7	74.5	62.1	52.3	50.1
2:00 AM	63.60	[illegible]	22908676.53	89.5	73.1	61.9	51.9	50.3
3:00 AM	61.40	[illegible]	13803842.65	86.3	72.5	57.7	50.7	49.7
4:00 AM	59.00	[illegible]	7943282.347	79.7	72.5	54.5	51.7	50.5
5:00 AM	57.50	[illegible]	5623413.252	79.5	68.7	55.7	52.5	51.3
6:00 AM	61.00	[illegible]	12589254.12	77.7	73.5	62.1	53.1	51.9
7:00 AM	64.70	[illegible]	29512092.27	85.7	76.1	66.7	55.7	52.5
Sum			219360347.6					
Ldn dBA			69.6					
Ldn dBA at nearest residences			68.0					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	76.84	-	2.92	-	1.25	-	5
	=	67.67						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	79.18	-	2.92	-	1.25	-	5
	=	70.01						

where: $L_{dn\ at\ 50\ ft}$	=	76.84	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.18	with warning horns
D=Distance ft	=	70	
Heff (sum of average path heights)	=	10.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	8	
G=Ground factor	=	0.56	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	5	
R=number of rows of houses	=	1	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 65.18

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 69.61

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.24

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.19	-	2.92	-	1.25	-	5
	=	70.02						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.83	-	2.92	-	1.25	-	5
	=	73.66						

where:	$L_{dn\ at\ 50\ ft}$	=	79.19	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.83	with warning horns
	D=Distance ft	=	70	
	Heff (sum of average path heights)	=	10.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	8	
	G=Ground factor	=	0.56	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	5	
	R=number of rows of houses	=	1	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	71.25
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	74.24

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.81	-	2.92	-	1.25	- 5
	=	70.64					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	83.21	-	2.92	-	1.25	- 5
	=	74.04					

where: $L_{dn\ at\ 50\ ft}$ = 79.81 without warning horns

$L'_{dn\ at\ 50\ ft}$ = 83.21 with warning horns

D=Distance ft	=	70	
Heff (sum of average path heig	=	10.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	8	
G=Ground factor	=	0.56	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	5	
R=number of rows of houses	=	1	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.73

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 74.57

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= 67.59
at nearest residences = [redacted]

$L_{dn\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= 71.85

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	[redacted]
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	68.12
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	69.10	69.10	8128305.162	85.1	81.1	73.7	56.7	51.6
9:00 AM	68.00	68.00	6309573.445	85.3	80.7	69.7	55.1	50.7
10:00 AM	66.90	66.90	4897788.194	84.3	80.1	69.5	54.5	49.9
11:00 AM	66.40	66.40	4365158.322	84.3	80.5	61.7	51.5	47.5
12:00 PM	69.80	69.80	9549925.86	84.7	80.5	73.9	52.5	46.9
1:00 PM	72.80	72.80	19054607.18	86.1	82.3	75.3	71.7	53.7
2:00 PM	67.00	67.00	5011872.336	84.9	80.7	65.7	55.1	48.5
3:00 PM	65.20	65.20	3311311.215	83.3	80.5	59.3	51.3	46.9
4:00 PM	66.60	66.60	4570881.896	84.9	80.5	63.7	51.9	47.9
5:00 PM	68.80	68.80	7585775.75	86.1	82.3	69.1	52.7	47.9
6:00 PM	71.40	71.40	13803842.65	88.3	84.1	74.7	61.3	57.1
7:00 PM	72.10	72.10	16218100.97	92.9	84.7	74.5	55.7	49.7
8:00 PM	68.00	68.00	6309573.445	84.9	81.9	67.3	54.7	50.1
9:00 PM	65.20	65.20	3311311.215	83.3	79.9	63.7	54.7	50.3
10:00 PM	64.70	64.70	2951209.227	84.3	79.1	61.9	53.1	49.7
11:00 PM	65.10	[illegible]	32359365.69	82.1	78.7	65.3	55.5	51.3
12:00 AM	63.30	[illegible]	21379620.9	82.3	78.7	60.1	53.1	51.1
1:00 AM	63.10	[illegible]	20417379.45	84.7	78.3	58.7	52.7	50.7
2:00 AM	61.80	[illegible]	15135612.48	81.1	78.1	54.3	50.3	48.7
3:00 AM	61.00	[illegible]	12589254.12	82.7	76.3	54.5	49.7	47.9
4:00 AM	63.50	[illegible]	22387211.39	85.1	79.1	51.9	49.9	48.7
5:00 AM	59.50	[illegible]	8912509.381	81.3	73.7	52.5	50.3	48.9
6:00 AM	63.60	[illegible]	22908676.53	82.1	78.9	55.1	51.5	50.3
7:00 AM	65.10	[illegible]	32359365.69	82.7	78.7	60.1	52.5	50.9
Sum			303828232.5					
Ldn dBA			71.0					
Ldn dBA at nearest residences			71.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	76.84	-	5.48	-	2.06	-	0
	=	69.30						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.18	-	5.48	-	2.06	-	0
	=	71.64						

where: $L_{dn\ at\ 50\ ft}$ = 76.84 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.18 with warning horns

D=Distance ft	=	94	
Heff (sum of average path heights	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 66.20

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.03

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 72.73

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.19	-	5.48	-	2.06	-	0
	=	71.65						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.83	-	5.48	-	2.06	-	0
	=	75.29						

where:	$L_{dn\ at\ 50\ ft}$	=	79.19	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.83	with warning horns
	D=Distance ft	=	94	
	Heff (sum of average path heights)	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	5	
	G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.73
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	75.79

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.81	-	5.48	-	2.06	- 0
	=	72.27					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	83.21	-	5.48	-	2.06	- 0
	=	75.67					

where: $L_{dn\ at\ 50\ ft}$ = 79.81 without warning horns

$L_{dn\ at\ 50\ ft}$ = 83.21 with warning horns

D=Distance ft	=	94	
Heff (sum of average path heig	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 73.22

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 76.13

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} . 10^{\wedge}L_{dn\ Existing/10})$
	=	69.21
at nearest residences	=	[redacted]
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} . 10^{\wedge}L_{dn\ Existing/10})$
	=	73.48

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	65.36
L_E >71	Lp=	[redacted]		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	70.42
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	72.90	72.90	19498446	91.1	86.5	75.1	57.7	52.7
9:00 AM	72.50	72.50	17782794.1	92.1	85.5	72.5	55.7	50.5
10:00 AM	71.00	71.00	12589254.12	91.5	85.5	68.3	52.7	49.9
11:00 AM	71.20	71.20	13182567.39	94.1	86.3	64.7	50.5	46.9
12:00 PM	70.50	70.50	11220184.54	92.7	85.5	69.7	52.9	48.7
1:00 PM	68.50	68.50	7079457.844	91.5	82.5	63.7	50.9	47.9
2:00 PM	70.80	70.80	12022644.35	92.7	85.5	64.1	51.5	48.5
3:00 PM	70.20	70.20	10471285.48	91.3	84.7	65.5	52.3	48.5
4:00 PM	73.80	73.80	23988329.19	99.1	82.9	68.9	55.3	50.3
5:00 PM	77.60	77.60	57543993.73	106.3	86.3	70.5	54.5	49.7
6:00 PM	72.70	72.70	18620871.37	94.3	86.3	72.9	55.5	51.1
7:00 PM	74.60	74.60	28840315.03	97.5	87.1	71.1	54.9	49.7
8:00 PM	73.60	73.60	22908676.53	99.1	86.3	65.9	53.3	49.7
9:00 PM	67.70	67.70	5888436.554	90.5	80.9	62.3	50.7	48.7
10:00 PM	66.70	66.70	4677351.413	89.1	79.5	66.7	54.9	51.9
11:00 PM	68.10	[illegible]	64565422.9	90.5	81.5	64.1	51.9	48.5
12:00 AM	65.40	[illegible]	34673685.05	89.7	78.3	60.1	51.3	48.7
1:00 AM	65.00	[illegible]	31622776.6	89.7	77.5	56.5	48.9	48.5
2:00 AM	63.40	[illegible]	21877616.24	85.5	76.7	53.9	52.1	48.7
3:00 AM	59.80	[illegible]	9549925.86	84.1	71.7	48.3	46.7	45.7
4:00 AM	68.10	[illegible]	64565422.9	91.3	82.1	54.7	52.3	51.9
5:00 AM	59.90	[illegible]	9772372.21	83.9	68.3	52.9	51.9	51.5
6:00 AM	70.40	[illegible]	109647819.6	91.9	83.7	61.3	52.5	49.9
7:00 AM	70.10	[illegible]	102329299.2	92.5	82.5	64.5	51.9	49.7
Sum			714918948.2					
Ldn dBA			74.7					
Ldn dBA at nearest residences			72.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	76.84	-	2.28	-	1.03	-	0
	=	73.53						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.18	-	2.28	-	1.03	-	0
	=	75.87						

where: $L_{dn\ at\ 50\ ft}$	=	76.84	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.18	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 68.62

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 74.74

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 76.62

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.19	-	2.28	-	1.03	-	0
	=	75.88						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.83	-	2.28	-	1.03	-	0
	=	79.52						

where:	$L_{dn\ at\ 50\ ft}$	=	79.19	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.83	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights)	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	10	
	G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.63
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.86

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	79.81	-	2.28	-	1.03	- 0
	=	76.50					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	83.21	-	2.28	-	1.03	- 0
	=	79.90					

where: $L_{dn\ at\ 50\ ft}$	=	79.81	without warning horns
$L_{dn\ at\ 50\ ft}$	=	83.21	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heig	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.15

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 80.21

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	73.45
at nearest residences	=	[redacted]
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	77.71

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	66.07
L_E >71	Lp=	[redacted]		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	71.08
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[redacted]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	72.90	72.90	19498446	91.1	86.5	75.1	57.7	52.7
9:00 AM	72.50	72.50	17782794.1	92.1	85.5	72.5	55.7	50.5
10:00 AM	71.00	71.00	12589254.12	91.5	85.5	68.3	52.7	49.9
11:00 AM	71.20	71.20	13182567.39	94.1	86.3	64.7	50.5	46.9
12:00 PM	70.50	70.50	11220184.54	92.7	85.5	69.7	52.9	48.7
1:00 PM	68.50	68.50	7079457.844	91.5	82.5	63.7	50.9	47.9
2:00 PM	70.80	70.80	12022644.35	92.7	85.5	64.1	51.5	48.5
3:00 PM	70.20	70.20	10471285.48	91.3	84.7	65.5	52.3	48.5
4:00 PM	73.80	73.80	23988329.19	99.1	82.9	68.9	55.3	50.3
5:00 PM	[redacted]	77.60	57543993.73	106.3	86.3	70.5	54.5	49.7
6:00 PM	72.70	72.70	18620871.37	94.3	86.3	72.9	55.5	51.1
7:00 PM	74.60	74.60	28840315.03	97.5	87.1	71.1	54.9	49.7
8:00 PM	73.60	73.60	22908676.53	99.1	86.3	65.9	53.3	49.7
9:00 PM	67.70	67.70	5888436.554	90.5	80.9	62.3	50.7	48.7
10:00 PM	66.70	66.70	4677351.413	89.1	79.5	66.7	54.9	51.9
11:00 PM	68.10	[redacted]	64565422.9	90.5	81.5	64.1	51.9	48.5
12:00 AM	65.40	[redacted]	34673685.05	89.7	78.3	60.1	51.3	48.7
1:00 AM	65.00	[redacted]	31622776.6	89.7	77.5	56.5	48.9	48.5
2:00 AM	63.40	[redacted]	21877616.24	85.5	76.7	53.9	52.1	48.7
3:00 AM	59.80	[redacted]	9549925.86	84.1	71.7	48.3	46.7	45.7
4:00 AM	68.10	[redacted]	64565422.9	91.3	82.1	54.7	52.3	51.9
5:00 AM	59.90	[redacted]	9772372.21	83.9	68.3	52.9	51.9	51.5
6:00 AM	70.40	[redacted]	109647819.6	91.9	83.7	61.3	52.5	49.9
7:00 AM	70.10	[redacted]	102329299.2	92.5	82.5	64.5	51.9	49.7
Sum			714918948.2					
Ldn dBA			74.7					

Existing

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	77.26	-	2.28	-	1.03	-	0
	=	73.95						
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	81.22	-	2.28	-	1.03	-	0
	=	77.91						

where: ***Leq at 50 ft*** = 77.26 without warning horns

Leq at 50 ft = 81.22 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heights	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 75.15

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.60

Existing L_{dn} with horns = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 79.75

No Build

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	79.3	-	2.28	-	1.03	-	0
	=	75.99						
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	83.8	-	2.28	-	1.03	-	0
	=	80.49						

where: $Leq_{at\ 50\ ft}$	=	79.3	without warning horns
$Leq_{at\ 50\ ft}$	=	83.8	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights)	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.60

$N\text{-}B\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 81.60

Build

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	80.42	-	2.28	-	1.03	- 0
	=	77.11					
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	84.35	-	2.28	-	1.03	- 0
	=	81.04					

where: $Leq_{at\ 50\ ft}$ = 80.42 without warning horns

$Leq_{at\ 50\ ft}$ = 84.35 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heig	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Build\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 79.25

$Build\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 82.03

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} + 10^{\wedge}L_{dn\ Existing/10})$
= [redacted]

$L_{dn\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} + 10^{\wedge}L_{dn\ Existing/10})$
= 78.14

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	[redacted]
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	75.26
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	73.00	73.00	19952623.15	90.9	86.5	75.5	59.3	53.3
9:00 AM	74.50	74.50	28183829.31	95.1	87.9	75.3	55.9	50.3
10:00 AM	71.00	71.00	12589254.12	92.3	85.1	68.3	53.9	49.5
11:00 AM	69.80	69.80	9549925.86	90.7	84.1	63.7	51.3	46.9
12:00 PM	76.10	76.10	40738027.78	101.7	86.7	64.3	51.7	47.7
1:00 PM	68.20	68.20	6606934.48	87.9	82.1	67.1	53.9	48.3
2:00 PM	69.20	69.20	8317637.711	88.9	84.1	63.7	51.5	47.9
3:00 PM	69.10	69.10	8128305.162	91.3	82.9	65.5	52.7	48.1
4:00 PM	68.10	68.10	6456542.29	89.5	82.7	65.3	55.3	49.9
5:00 PM	71.50	71.50	14125375.45	90.7	85.1	72.5	54.9	50.1
6:00 PM	74.30	74.30	26915348.04	92.7	86.7	78.5	63.3	54.3
7:00 PM	73.80	73.80	23988329.19	93.7	86.9	74.3	56.7	52.3
8:00 PM	73.30	73.30	21379620.9	93.9	86.3	73.9	55.5	50.7
9:00 PM	71.50	71.50	14125375.45	91.5	85.7	58.3	47.0	43.5
10:00 PM	69.30	69.30	8511380.382	90.7	84.9	59.3	48.3	45.1
11:00 PM	72.10	82.10	162181009.7	94.3	86.5	63.7	48.7	45.3
12:00 AM	67.60	77.60	57543993.73	90.7	81.7	57.5	47.7	44.9
1:00 AM	70.30	80.30	107151930.5	91.5	85.7	58.3	46.9	43.3
2:00 AM	69.50	79.50	89125093.81	92.3	83.5	56.9	45.5	43.1
3:00 AM	64.70	74.70	29512092.27	87.9	80.3	51.1	44.9	40.9
4:00 AM	67.40	77.40	54954087.39	93.5	79.7	54.9	44.9	42.3
5:00 AM	66.00	76.00	39810717.06	89.5	79.5	54.3	46.5	43.1
6:00 AM	69.20	79.20	83176377.11	89.3	84.1	61.1	49.9	45.9
7:00 AM	74.00	84.00	251188643.2	94.9	87.9	74.9	54.5	50.5
Sum			1124212454					
Ldn dBA			76.7					
Ldn dBA at nearest residences			77.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.13	-	2.28	-	0.95	- 0
	=	75.90					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	82.54	-	2.28	-	0.95	- 0
	=	79.31					

where: $L_{dn\ at\ 50\ ft}$	=	79.13	without warning horns
$L_{dn\ at\ 50\ ft}$	=	82.54	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	69.00
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.71
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.70

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.1	-	2.28	-	0.95	-	0
	=	77.87						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	84.81	-	2.28	-	0.95	-	0
	=	81.58						

where: $L_{dn\ at\ 50\ ft}$	=	81.1	without warning horns
$L_{dn\ at\ 50\ ft}$	=	84.81	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights)	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.40
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.82

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	80.26	-	2.28	-	0.95	- 0
	=	77.03					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	84.44	-	2.28	-	0.95	- 0
	=	81.21					

where: $L_{dn\ at\ 50\ ft}$ = 80.26 without warning horns

$L_{dn\ at\ 50\ ft}$ = 84.44 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heights)	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.67

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 81.47

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	70.63
at nearest residences	=	[redacted]
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	76.71

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	70.27
L_E >71	Lp=	[redacted]		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.94
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq-3dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	74.70	74.70	29512092.27	94.6	89.6	63.4	53.6	47.6
9:00 AM	74.50	74.50	28183829.31	96.8	89.0	63.8	55.4	48.8
10:00 AM	74.40	74.40	27542287.03	101.0	85.6	65.4	57.6	48.4
11:00 AM	66.70	66.70	4677351.413	91.6	77.6	58.2	50.4	47.0
12:00 PM	70.20	70.20	10471285.48	91.8	86.2	59.0	51.8	47.4
1:00 PM	73.50	73.50	22387211.39	94.6	90.8	59.6	52.2	47.6
2:00 PM	70.70	70.70	11748975.55	95.2	83.2	59.6	52.8	49.0
3:00 PM	69.30	69.30	8511380.382	93.8	81.0	61.0	54.6	49.6
4:00 PM	64.70	64.70	2951209.227	91.0	79.4	60.6	54.2	49.4
5:00 PM	70.80	70.80	12022644.35	92.0	85.4	61.6	53.4	49.2
6:00 PM	71.60	71.60	14454397.71	94.2	85.0	62.4	55.2	50.0
7:00 PM	71.80	71.80	15135612.48	92.6	86.4	64.0	56.0	50.2
8:00 PM	71.50	71.50	14125375.45	94.4	84.8	61.2	54.2	49.2
9:00 PM	70.60	70.60	11481536.21	94.6	84.0	59.6	52.2	47.6
10:00 PM	69.60	69.60	9120108.394	94.8	81.8	59.8	52.0	47.0
11:00 PM	68.30	[illegible]	67608297.54	92.4	81.4	59.2	50.6	46.2
12:00 AM	69.80	[illegible]	95499258.6	93.8	80.2	57.8	49.6	44.8
1:00 AM	71.10	[illegible]	128824955.2	96.4	80.8	54.2	43.6	41.4
2:00 AM	66.60	[illegible]	45708818.96	93.6	72.2	52.4	43.0	41.4
3:00 AM	69.30	[illegible]	85113803.82	95.2	64.2	50.6	43.8	42.2
4:00 AM	68.40	[illegible]	69183097.09	94.2	80.2	47.8	43.2	42.0
5:00 AM	48.50	[illegible]	707945.7844	65.4	59.4	51.4	43.4	42.0
6:00 AM	69.60	[illegible]	91201083.94	94.0	81.0	55.6	45.8	43.0
7:00 AM	70.20	[illegible]	104712854.8	91.6	85.4	58.8	49.8	45.0
Sum			910885412.4					
Ldn dBA			75.8					
Ldn dBA at nearest residences			76.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	77.64	-	2.28	-	0.95	-	0
	=	74.41						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.91	-	2.28	-	0.95	-	0
	=	76.68						

where: $L_{dn\ at\ 50\ ft}$ = 77.64 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.91 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heights	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 70.15

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 75.79

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.55

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	78.73	-	2.28	-	0.95	-	0
	=	75.50						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.28	-	2.28	-	0.95	-	0
	=	76.05						

where: $L_{dn\ at\ 50\ ft}$	=	78.73	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.28	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights)	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.61
N-B $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.05

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	0Glog(D/4:	-	$A_{shielding}$
	=	78.86	-	2.28	-	0.95	-	0
	=	75.63						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	0Glog(D/4:	-	$A_{shielding}$
	=	79.8	-	2.28	-	0.95	-	0
	=	76.57						

where: $L_{dn\ at\ 50\ ft}$ = 78.86 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.8 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heigl	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 76.71

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.46

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	69.52
at nearest residences	=	[redacted] IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	69.48
L_E >71	Lp=	[redacted]		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.22
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	73.30	73.30	21379620.9	92.1	87.9	68.3	51.7	47.9
9:00 AM	75.20	75.20	33113112.15	95.1	89.7	64.9	50.7	46.3
10:00 AM	72.00	72.00	15848931.92	92.3	88.3	53.9	47.7	43.9
11:00 AM	69.30	69.30	8511380.382	92.1	83.5	53.5	46.7	42.3
12:00 PM	70.00	70.00	10000000	92.3	84.9	55.9	47.1	42.3
1:00 PM	69.60	69.60	9120108.394	91.9	83.9	54.5	47.1	42.3
2:00 PM	69.10	69.10	8128305.162	92.7	80.7	54.9	47.5	43.7
3:00 PM	70.10	70.10	10232929.92	93.1	84.5	55.9	48.5	44.7
4:00 PM	67.20	67.20	5248074.602	89.1	83.5	57.3	49.7	44.7
5:00 PM	70.60	70.60	11481536.21	91.5	85.1	63.1	53.1	47.3
6:00 PM	74.50	74.50	28183829.31	93.1	89.5	69.1	53.1	47.3
7:00 PM	74.60	74.60	28840315.03	94.5	89.5	62.1	50.1	45.7
8:00 PM	74.50	74.50	28183829.31	95.7	88.7	60.7	49.1	45.3
9:00 PM	71.70	71.70	14791083.88	92.3	87.7	56.5	48.5	44.7
10:00 PM	72.50	72.50	17782794.1	95.1	87.7	56.7	46.7	42.9
11:00 PM	71.50	[illegible]	141253754.5	92.0	88.1	53.0	47.7	43.5
12:00 AM	69.90	[illegible]	97723722.1	94.5	83.9	50.3	44.9	42.5
1:00 AM	71.10	[illegible]	128824955.2	93.7	85.7	47.9	41.9	39.7
2:00 AM	71.00	[illegible]	125892541.2	91.9	85.5	47.9	40.3	38.1
3:00 AM	68.00	[illegible]	63095734.45	93.7	68.9	45.7	38.7	37.1
4:00 AM	65.40	[illegible]	34673685.05	87.7	80.9	45.1	39.5	37.3
5:00 AM	65.20	[illegible]	33113112.15	87.9	77.3	45.9	40.7	38.9
6:00 AM	68.90	[illegible]	77624711.66	91.1	84.7	51.1	43.9	41.5
7:00 AM	74.80	[illegible]	301995172	95.3	90.1	57.3	49.1	46.3
Sum			1255043240					
Ldn dBA			77.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	78.36	-	0.83	-	0.62	- 0
	=	76.92					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	82.31	-	0.83	-	0.62	- 0
	=	80.87					

where: $L_{dn\ at\ 50\ ft}$	=	78.36	without warning horns
$L_{dn\ at\ 50\ ft}$	=	82.31	with warning horns
D=Distance ft	=	55	
Heff (sum of average path heights	=	12.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	12	
G=Ground factor	=	0.53	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 65.01

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.19

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 80.98

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	80.18	-	0.83	-	0.62	-	0
	=	78.74						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	84.38	-	0.83	-	0.62	-	0
	=	82.94						

where: $L_{dn\ at\ 50\ ft}$	=	80.18	without warning horns
$L_{dn\ at\ 50\ ft}$	=	84.38	with warning horns
D=Distance ft	=	55	
Heff (sum of average path heights)	=	12.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	12	
G=Ground factor	=	0.53	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.92
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	83.00

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4;	- $A_{shielding}$
	=	79.49	-	0.83	-	0.62	- 0
	=	78.05					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4;	- $A_{shielding}$
	=	84.11	-	0.83	-	0.62	- 0
	=	82.67					

where: $L_{dn\ at\ 50\ ft}$ = 79.49 without warning horns

$L_{dn\ at\ 50\ ft}$ = 84.11 with warning horns

D=Distance ft	=	55	
Heff (sum of average path	=	12.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	12	
G=Ground factor	=	0.53	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.26

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 82.74

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	[illegible]

$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	77.97

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	70.26
L_E >71	Lp=	[illegible]		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.93
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	80.10	80.10	102329299.2	101.1	91.7	79.9	76.1	71.9
9:00 AM	77.90	77.90	61659500.19	101.1	89.7	77.3	71.5	68.3
10:00 AM	75.70	75.70	37153522.91	96.7	88.5	73.1	68.1	65.5
11:00 AM	74.50	74.50	28183829.31	96.9	86.5	72.9	67.7	65.1
12:00 PM	78.00	78.00	63095734.45	103.5	91.1	73.9	68.9	66.3
1:00 PM	71.80	71.80	15135612.48	90.1	85.1	71.9	67.3	64.9
2:00 PM	76.60	76.60	45708818.96	95.9	86.7	78.9	73.1	68.9
3:00 PM	74.80	74.80	30199517.2	95.9	87.1	74.1	68.9	66.7
4:00 PM	74.60	74.60	28840315.03	96.7	86.9	74.1	68.5	66.1
5:00 PM	77.10	77.10	51286138.4	98.9	89.7	76.1	68.3	65.9
6:00 PM	79.20	79.20	83176377.11	99.9	91.9	76.7	68.9	66.7
7:00 PM	78.50	78.50	70794578.44	97.9	91.5	76.7	68.5	66.1
8:00 PM	76.10	76.10	40738027.78	97.3	91.1	73.1	66.7	64.7
9:00 PM	76.80	76.80	47863009.23	101.5	89.1	71.5	65.5	63.3
10:00 PM	74.00	74.00	25118864.32	94.1	87.5	71.3	64.9	62.7
11:00 PM	75.90	85.90	389045145	101.1	86.9	70.5	63.5	61.3
12:00 AM	72.70	82.70	186208713.7	93.9	86.3	70.9	62.7	60.9
1:00 AM	71.30	81.30	134896288.3	92.7	84.1	68.9	62.5	60.5
2:00 AM	73.40	83.40	218776162.4	95.1	87.3	72.3	62.7	60.1
3:00 AM	70.40	80.40	109647819.6	95.7	81.7	68.3	60.7	58.7
4:00 AM	72.70	82.70	186208713.7	97.1	83.9	68.9	60.3	58.3
5:00 AM	70.20	80.20	104712854.8	93.3	83.5	67.1	62.7	60.9
6:00 AM	73.50	83.50	223872113.9	91.9	88.1	71.1	65.7	62.7
7:00 AM	77.80	87.80	602559586.1	100.7	91.3	75.1	68.1	64.3
Sum			2887210542	101.1	91.7	79.9	76.1	71.9
Ldn dBA			80.8					
Ldn dBA at nearest residences			76.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	75.24	-	-4.44	-	-0.87	-	0
	=	80.55						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	79.07	-	-4.44	-	-0.87	-	0
	=	84.38						

where: $L_{dn\ at\ 50\ ft}$ = 75.24 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.07 with warning horns

D=Distance ft	=	30	
Heff (sum of average path heights	=	8.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	4	
G=Ground factor	=	0.60	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 68.34

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 80.80

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 84.49

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	77.3	-	-4.44	-	-0.87	-	0
	=	82.61						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.58	-	-4.44	-	-0.87	-	0
	=	87.89						

where: $L_{dn\ at\ 50\ ft}$	=	77.3	without warning horns
$L_{dn\ at\ 50\ ft}$	=	82.58	with warning horns
D=Distance ft	=	30	
Heff (sum of average path heights)	=	8.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	4	
G=Ground factor	=	0.60	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	82.77
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	87.94

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.63	-	-4.44	-	-0.87	- 0
	=	80.94					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	80.69	-	-4.44	-	-0.87	- 0
	=	86.00					

where: $L_{dn\ at\ 50\ ft}$ = 75.63 without warning horns

$L_{dn\ at\ 50\ ft}$ = 80.69 with warning horns

D=Distance ft	=	30	
Heff (sum of average path	=	8.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	4	
G=Ground factor	=	0.60	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 81.17

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 86.07

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	70.28
at nearest residences	=	[redacted] IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	80.93

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	69.48
$L_E>71$	Lp=	[redacted]		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.22
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	78.50	78.50	70794578.44	102.1	91.5	69.5	60.7	58.7
9:00 AM	77.50	77.50	56234132.52	102.1	89.9	67.1	57.7	54.7
10:00 AM	70.60	70.60	11481536.21	95.5	83.5	64.5	56.7	54.1
11:00 AM	73.90	73.90	24547089.16	98.7	86.3	61.7	55.3	52.5
12:00 PM	68.60	68.60	7244359.601	94.1	82.9	61.5	55.3	51.9
1:00 PM	68.30	68.30	6760829.754	92.3	81.9	63.1	56.5	53.9
2:00 PM	68.40	68.40	6918309.709	94.3	80.5	62.3	55.7	53.1
3:00 PM	68.00	68.00	6309573.445	93.1	82.9	65.1	58.3	54.9
4:00 PM	69.10	69.10	8128305.162	91.7	82.5	66.1	59.7	56.7
5:00 PM	71.50	71.50	14125375.45	94.3	85.3	56.9	58.7	55.3
6:00 PM	74.90	74.90	30902954.33	98.5	87.5	71.1	56.5	51.9
7:00 PM	73.60	73.60	22908676.53	94.5	87.1	69.3	54.7	50.1
8:00 PM	72.70	72.70	18620871.37	96.1	85.7	65.7	52.3	49.3
9:00 PM	78.60	78.60	72443596.01	105.7	87.5	63.5	51.5	49.3
10:00 PM	70.60	70.60	11481536.21	93.3	85.3	62.1	52.1	49.5
11:00 PM	67.60	[illegible]	57543993.73	89.3	82.9	60.3	52.9	50.9
12:00 AM	70.00	[illegible]	100000000	95.9	82.9	55.3	48.5	46.7
1:00 AM	66.20	[illegible]	41686938.35	88.9	80.3	52.1	47.1	45.7
2:00 AM	66.20	[illegible]	41686938.35	90.7	79.9	54.9	50.5	49.3
3:00 AM	55.80	[illegible]	3801893.963	81.7	63.5	49.9	47.1	45.5
4:00 AM	64.20	[illegible]	26302679.92	87.1	78.7	54.1	49.5	47.7
5:00 AM	68.80	[illegible]	75857757.5	93.3	82.3	54.9	49.1	47.1
6:00 AM	68.30	[illegible]	67608297.54	91.5	82.5	60.3	55.7	51.1
7:00 AM	69.20	[illegible]	83176377.11	89.1	83.3	61.1	56.1	53.1
Sum			866566600.4					
Ldn dBA			75.6					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	75.24	-	2.80	-	1.37	- 0
	=	71.08					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	79.07	-	2.80	-	1.37	- 0
	=	74.91					

where: $L_{dn\ at\ 50\ ft}$ = 75.24 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.07 with warning horns

D=Distance ft	=	69	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 67.14

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 72.55

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 75.58

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	77.3	-	2.80	-	1.37	-	0
	=	73.14						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.58	-	2.80	-	1.37	-	0
	=	78.42						

where: $L_{dn\ at\ 50\ ft}$ = 77.3 without warning horns

$L_{dn\ at\ 50\ ft}$ = 82.58 with warning horns

D=Distance ft	=	69	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 74.11

$N\text{-}B\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.73

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.63	-	2.80	-	1.37	- 0
	=	71.47					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	80.69	-	2.80	-	1.37	- 0
	=	76.53					

where: $L_{dn\ at\ 50\ ft}$ = 75.63 without warning horns

$L_{dn\ at\ 50\ ft}$ = 80.69 with warning horns

D=Distance ft	=	69	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hou:	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 72.83

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.00

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= 60.80

$L_{dn\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= [redacted] IMPACT

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	68.86
L_E >71	Lp=	[redacted]		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	73.65
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[redacted]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM		0.00	1					
9:00 AM	68.98	68.98	7906786.28	93.1	78.9	57.3	54.3	52.5
10:00 AM		0.00	1					
11:00 AM		0.00	1					
12:00 PM		0.00	1					
1:00 PM		0.00	1					
2:00 PM		0.00	1					
3:00 PM		0.00	1					
4:00 PM		0.00	1					
5:00 PM		0.00	1					
6:00 PM		0.00	1					
7:00 PM		0.00	1					
8:00 PM		0.00	1					
9:00 PM		0.00	1					
10:00 PM		0.00	1					
11:00 PM		[redacted]	10					
12:00 AM		[redacted]	10					
1:00 AM		[redacted]	10					
2:00 AM		[redacted]	10					
3:00 AM		[redacted]	10					
4:00 AM		[redacted]	10					
5:00 AM		[redacted]	10					
6:00 AM		[redacted]	10					
7:00 AM		[redacted]	10					
Sum			7906890.28					
Leq dBA			69.0					

Existing

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	71.53	-	1.58	-	0.98	-	0
	=	68.96						
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	72.8	-	1.58	-	0.98	-	0
	=	70.23						

where: $Leq_{at\ 50\ ft}$ = 71.53 without warning horns

$Leq_{at\ 50\ ft}$ = 72.8 with warning horns

D=Distance ft	=	60	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Traffic\ L_{dn}$ = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 44.52

$Existing\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 68.98

$Existing\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 70.25

No Build

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	71.9	-	1.58	-	0.98	-	0
	=	69.33						
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	73.07	-	1.58	-	0.98	-	0
	=	70.50						

where: $Leq_{at\ 50\ ft}$ = 71.9 without warning horns

$Leq_{at\ 50\ ft}$ = 73.07 with warning horns

D=Distance ft	=	60	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 69.35

$N\text{-}B\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 70.52

Build

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	72.61	-	1.58	-	0.98	- 0
	=	70.04					
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	73.82	-	1.58	-	0.98	- 0
	=	71.25					

where: $Leq_{at\ 50\ ft}$ = 72.61 without warning horns

$Leq_{at\ 50\ ft}$ = 73.82 with warning horns

D=Distance ft	=	60	
Heff (sum of average path heig	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Build\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 70.06

$Build\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.26

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= [illegible] NO IMPACT

$L_{dn\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= 64.46

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	63.60
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	68.78
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM		0.00	1					
9:00 AM	77.30	77.30	53703179.64	84.5	78.5	62.0	52.5	50.0
10:00 AM		0.00	1					
11:00 AM		0.00	1					
12:00 PM		0.00	1					
1:00 PM		0.00	1					
2:00 PM		0.00	1					
3:00 PM		0.00	1					
4:00 PM		0.00	1					
5:00 PM		0.00	1					
6:00 PM		0.00	1					
7:00 PM		0.00	1					
8:00 PM		0.00	1					
9:00 PM		0.00	1					
10:00 PM		0.00	1					
11:00 PM		[illegible]	10					
12:00 AM		[illegible]	10					
1:00 AM		[illegible]	10					
2:00 AM		[illegible]	10					
3:00 AM		[illegible]	10					
4:00 AM		[illegible]	10					
5:00 AM		[illegible]	10					
6:00 AM		[illegible]	10					
7:00 AM		[illegible]	10					
Sum			53703283.64					
Leq dBA			77.3					

Existing

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	67.89	-	-4.73	-	-0.88	- 0
	=	73.50					
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	68.96	-	-4.73	-	-0.88	- 0
	=	74.57					

where: $Leq_{at\ 50\ ft}$	=	67.89	without warning horns
$Leq_{at\ 50\ ft}$	=	68.96	with warning horns
D=Distance ft	=	29	
Heff (sum of average path heights	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Traffic\ L_{dn}$	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	74.96
$Existing\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.30
$Existing\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.78

No Build

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	68.12	-	-4.73	-	-0.88	-	0
	=	73.73						
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	69.14	-	-4.73	-	-0.88	-	0
	=	74.75						

where: $Leq_{at\ 50\ ft}$	=	68.12	without warning horns
$Leq_{at\ 50\ ft}$	=	69.14	with warning horns
D=Distance ft	=	29	
Heff (sum of average path heights)	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.40
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.87

Build

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	69.73	-	-4.73	-	-0.88	- 0
	=	75.34					
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	- $A_{shielding}$
	=	70.84	-	-4.73	-	-0.88	- 0
	=	76.45					

where: $Leq_{at\ 50\ ft}$ = 69.73 without warning horns

$Leq_{at\ 50\ ft}$ = 70.84 with warning horns

D=Distance ft	=	29	
Heff (sum of average path heig	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Build\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.16

$Build\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.78

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= [redacted] IMPACT

$L_{dn\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
= 71.91

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	[redacted] 70.36
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	75.02
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	86.00	86.00	398107170.6	110.7	98.7	72.5	58.9	53.3
9:00 AM	80.50	80.50	112201845.4	108.1	79.7	67.7	57.7	53.5
10:00 AM	78.10	78.10	64565422.9	104.9	81.9	67.9	57.3	52.9
11:00 AM	84.00	84.00	251188643.2	108.9	97.5	68.9	55.5	50.1
12:00 PM	63.90	63.90	2454708.916	82.1	75.7	66.7	54.9	49.5
1:00 PM	77.60	77.60	57543993.73	103.7	80.5	67.5	55.5	50.3
2:00 PM	79.90	79.90	97723722.1	107.9	78.5	67.5	55.9	50.3
3:00 PM	78.70	78.70	74131024.13	102.9	83.9	69.1	56.5	51.5
4:00 PM	65.60	65.60	3630780.548	85.7	76.9	67.9	57.1	52.9
5:00 PM	78.10	78.10	64565422.9	103.7	82.1	68.9	56.7	51.7
6:00 PM	84.30	84.30	269153480.4	108.5	96.3	70.5	57.7	52.9
7:00 PM	81.90	81.90	154881661.9	102.7	97.9	71.1	57.7	53.1
8:00 PM	81.40	81.40	138038426.5	106.7	85.5	65.9	54.5	49.5
9:00 PM	80.20	80.20	104712854.8	106.3	77.7	62.3	54.3	49.7
10:00 PM	76.90	76.90	48977881.94	102.5	80.5	61.7	53.1	48.7
11:00 PM	75.60	[illegible]	363078054.8	102.7	73.5	61.5	55.5	50.9
12:00 AM	78.00	[illegible]	630957344.5	104.5	77.1	58.1	50.1	44.1
1:00 AM	54.90	[illegible]	3090295.433	77.1	64.1	55.7	48.3	42.7
2:00 AM	75.20	[illegible]	331131121.5	103.5	69.1	53.3	46.9	42.9
3:00 AM	75.20	[illegible]	331131121.5	103.7	64.1	50.1	44.9	42.5
4:00 AM	78.00	[illegible]	630957344.5	105.1	70.3	50.9	45.5	41.7
5:00 AM	78.00	[illegible]	630957344.5	105.0	70.2	50.8	45.6	42.0
6:00 AM	83.00	[illegible]	1995262315	111.3	78.5	54.9	47.1	44.3
7:00 AM	84.70	[illegible]	2951209227	111.7	93.7	65.3	54.3	47.1
Sum			9709651208					
Ldn dBA			86.1					
Ldn dBA at nearest residences			79.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	71.75	-	-4.15	-	-0.84	-	0
	=	76.74						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.84	-	-4.15	-	-0.84	-	0
	=	84.83						

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	31	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 80.03

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 81.70

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 86.07

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	-4.15	-	-0.84	-	0
	=	80.20						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.9	-	-4.15	-	-0.84	-	0
	=	86.89						

where:	$L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	81.9	with warning horns
	D=Distance ft	=	31	
	Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	0	
	G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	83.13
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	87.70

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4;	- $A_{shielding}$
	=	75.21	-	-4.15	-	-0.84	- 0
	=	80.20					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4;	- $A_{shielding}$
	=	81.94	-	-4.15	-	-0.84	- 0
	=	86.93					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	31	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 83.13

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 87.74

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	77.60
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	82.76
at nearest residences	=	75.90 - SEVERE IMPACT

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	72.07
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	76.58
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	63.90	63.90	2454708.916	87.9	75.1	60.3	51.7	48.9
9:00 AM	61.60	61.60	1445439.771	85.7	71.9	61.9	52.3	48.3
10:00 AM	62.50	62.50	1778279.41	83.5	75.1	60.7	49.3	46.1
11:00 AM	58.00	58.00	630957.3445	79.7	67.3	60.1	48.9	45.9
12:00 PM	64.50	64.50	2818382.931	90.7	74.7	55.1	48.7	45.9
1:00 PM	54.90	54.90	309029.5433	77.9	66.5	53.5	47.7	44.3
2:00 PM	51.70	51.70	147910.8388	73.7	60.5	51.9	46.7	43.3
3:00 PM	56.70	56.70	467735.1413	80.9	66.1	56.3	48.7	45.1
4:00 PM	57.90	57.90	616595.0019	79.7	68.3	59.7	50.3	45.9
5:00 PM	62.40	62.40	1737800.829	79.1	74.1	58.9	51.1	47.9
6:00 PM	59.70	59.70	933254.3008	85.1	69.1	57.5	50.9	48.3
7:00 PM	63.40	63.40	2187761.624	87.3	77.5	58.1	51.9	49.7
8:00 PM	69.70	69.70	9332543.008	81.1	80.5	77.7	51.5	48.7
9:00 PM	54.40	54.40	275422.8703	74.7	66.1	54.5	50.1	47.5
10:00 PM	61.70	61.70	1479108.388	84.7	74.3	61.1	44.7	40.7
11:00 PM	52.20	[illegible]	1659586.907	77.1	62.7	48.1	42.5	39.7
12:00 AM	56.00	[illegible]	3981071.706	81.3	67.1	53.3	42.1	38.5
1:00 AM	41.60	[illegible]	144543.9771	56.5	53.5	42.5	38.3	36.1
2:00 AM	47.10	[illegible]	512861.384	73.3	55.3	41.7	37.7	35.3
3:00 AM	39.80	[illegible]	95499.2586	51.9	48.9	41.5	37.7	35.9
4:00 AM	54.60	[illegible]	2884031.503	80.5	62.1	45.1	37.7	35.7
5:00 AM	51.00	[illegible]	1258925.412	77.3	59.7	42.5	38.3	35.9
6:00 AM	48.70	[illegible]	741310.2413	75.9	49.7	42.5	39.3	35.9
7:00 AM	62.60	[illegible]	18197008.59	86.3	75.1	56.9	47.7	43.1
Sum			56089768.89					
Ldn dBA			63.7					
Ldn dBA at nearest residences			67.9					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	71.75	-	7.23	-	2.77	-	0
	=	61.74						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.84	-	7.23	-	2.77	-	0
	=	69.83						

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	115	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	1	
0 for gaps more than 65 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	59.27
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	63.69
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	70.20

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	7.23	-	2.77	-	0
	=	65.20						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	7.23	-	2.77	-	0
	=	71.93						

where:	$L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
	D=Distance ft	=	115	
	Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	0	
	G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	1	
	0 for gaps more than 65 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	66.19
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.16

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	75.21	-	7.23	-	2.77	-	0
	=	65.20						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	81.94	-	7.23	-	2.77	-	0
	=	71.93						

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	115	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	1	

0 for gaps more than 65 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 66.19

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 72.16

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} . 10^{\wedge}L_{dn\ Existing/10})$
	=	62.60
at nearest residences	=	6630 - IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} . 10^{\wedge}L_{dn\ Existing/10})$
	=	67.77

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	62.82
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	68.05
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	71.00	71.00	12589254.12	94.9	83.9	60.3	52.9	49.9
9:00 AM	68.50	68.50	7079457.844	94.3	74.7	57.5	51.5	48.7
10:00 AM	62.30	62.30	1698243.652	84.5	68.5	64.7	53.7	49.3
11:00 AM	61.70	61.70	1479108.388	85.3	70.7	58.7	55.1	50.9
12:00 PM	61.90	61.90	1548816.619	83.1	76.3	57.9	53.1	49.9
1:00 PM	61.60	61.60	1445439.771	85.5	67.1	57.9	52.9	50.3
2:00 PM	54.10	54.10	257039.5783	67.9	60.3	56.5	52.9	49.3
3:00 PM	63.00	63.00	1995262.315	88.7	71.9	58.3	52.9	49.7
4:00 PM	62.20	62.20	1659586.907	90.1	66.1	56.5	51.1	48.5
5:00 PM	64.90	64.90	3090295.433	91.7	71.3	56.7	50.3	48.1
6:00 PM	67.80	67.80	6025595.861	91.5	76.9	55.9	51.5	50.1
7:00 PM	66.80	66.80	4786300.923	92.3	74.9	59.3	51.5	49.5
8:00 PM	69.60	69.60	9120108.394	94.3	82.3	54.7	49.9	48.3
9:00 PM	69.60	69.60	9120108.394	95.9	77.5	53.5	47.9	45.9
10:00 PM	59.20	59.20	831763.7711	86.1	60.5	53.9	46.1	44.7
11:00 PM	60.20	[illegible]	10471285.48	85.7	66.5	48.1	44.9	41.9
12:00 AM	57.90	[illegible]	6165950.019	80.5	71.3	48.7	43.3	39.7
1:00 AM	46.90	[illegible]	489778.8194	68.9	58.3	44.3	40.5	37.3
2:00 AM	56.60	[illegible]	4570881.896	83.3	60.3	45.9	40.5	37.5
3:00 AM	43.20	[illegible]	208929.6131	49.7	48.9	46.5	41.3	38.5
4:00 AM	56.40	[illegible]	4365158.322	82.9	57.1	50.5	44.5	39.9
5:00 AM	63.80	[illegible]	23988329.19	89.5	68.1	46.3	41.9	38.7
6:00 AM	58.80	[illegible]	7585775.75	85.3	60.7	45.9	42.5	39.9
7:00 AM	71.80	[illegible]	151356124.8	95.7	85.9	56.3	47.7	44.5
Sum			271928595.9					
Ldn dBA			70.5					
Ldn dBA at nearest residences			67.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	71.75	-	1.73	-	1.03	-	0
	=	69.00						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.84	-	1.73	-	1.03	-	0
	=	77.09						

where: $L_{dn\ at\ 50\ ft}$ = 71.75 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.84 with warning horns

D=Distance ft	=	61	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 65.32

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 70.54

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.37

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	1.73	-	1.03	-	0
	=	72.46						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	1.73	-	1.03	-	0
	=	79.19						

where: $L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
D=Distance ft	=	61	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	73.22
N-B $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.36

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ }$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.21	-	1.73	-	1.03	- 0
	=	72.46					
$L_{dn\ (with\ war.}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	81.94	-	1.73	-	1.03	- 0
	=	79.19					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	61	
Heff (sum of average path height	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 73.22

Build $L_{dn\ }$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 79.36

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	69.85
at nearest residences	=	66.70 [redacted]
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	75.02

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	62.39
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	67.66
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	[redacted]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	69.20	69.20	8317637.711	92.7	82.9	60.9	55.7	54.3
9:00 AM	58.30	58.30	676082.9754	81.3	65.1	59.1	54.9	52.9
10:00 AM	59.60	59.60	912010.8394	83.5	65.5	57.7	53.3	51.5
11:00 AM	58.90	58.90	776247.1166	81.1	67.3	58.7	53.5	51.9
12:00 PM	58.70	58.70	741310.2413	74.5	69.9	62.3	53.5	51.5
1:00 PM	63.10	63.10	2041737.945	82.9	73.3	66.7	54.1	51.9
2:00 PM	57.20	57.20	524807.4602	73.9	69.7	57.7	52.9	51.3
3:00 PM	66.00	66.00	3981071.706	83.3	77.5	70.3	55.3	51.5
4:00 PM	55.90	55.90	389045.145	71.9	64.7	57.5	53.7	51.3
5:00 PM	59.50	59.50	891250.9381	81.5	70.7	56.7	53.9	52.3
6:00 PM	68.10	68.10	6456542.29	93.1	78.9	57.3	54.3	52.5
7:00 PM	64.60	64.60	2884031.503	89.3	69.3	56.9	54.1	52.9
8:00 PM	65.80	65.80	3801893.963	91.1	77.9	56.5	53.7	52.1
9:00 PM	58.70	58.70	741310.2413	82.9	65.5	55.3	53.1	52.1
10:00 PM	56.60	56.60	457088.1896	82.1	57.9	54.7	52.9	51.9
11:00 PM	57.10	[redacted]	5128613.84	80.9	62.7	54.3	52.1	50.5
12:00 AM	58.30	[redacted]	6760829.754	82.3	62.3	55.3	52.5	51.1
1:00 AM	52.00	[redacted]	1584893.192	60.7	56.3	53.7	51.1	50.1
2:00 AM	56.10	[redacted]	4073802.778	81.5	58.3	53.9	50.9	49.9
3:00 AM	51.50	[redacted]	1412537.545	55.3	54.3	53.7	50.5	49.7
4:00 AM	64.70	[redacted]	29512092.27	91.5	68.9	54.5	50.7	49.3
5:00 AM	57.20	[redacted]	5248074.602	82.9	59.1	55.3	52.1	50.1
6:00 AM	54.80	[redacted]	3019951.72	76.1	58.9	55.3	52.5	50.9
7:00 AM	68.40	[redacted]	69183097.09	91.9	80.3	57.3	55.3	52.7
Sum			159515961.1					
Ldn dBA			68.2					
Ldn dBA at nearest residences			67.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	71.75	-	2.92	-	1.31	-	0
	=	67.52						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	$20log(D/50)$	-	$10Glog(D/42)$	-	$A_{shielding}$
	=	79.84	-	2.92	-	1.31	-	0
	=	75.61						

where: $L_{dn\ at\ 50\ ft}$ = 71.75 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.84 with warning horns

D=Distance ft	=	70	
Heff (sum of average path heights	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 60.00

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 68.23

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 75.73

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	2.92	-	1.31	-	0
	=	70.98						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	2.92	-	1.31	-	0
	=	77.71						

where: $L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
D=Distance ft	=	70	
Heff (sum of average path heights)	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.31

$N\text{-}B\ L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.78

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.21	-	2.92	-	1.31	- 0
	=	70.98					
$L_{dn\ (with\ wa}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	81.94	-	2.92	-	1.31	- 0
	=	77.71					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	70	
Heff (sum of average path height:	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.31

Build $L_{dn\ }$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.78

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	*10log(10^$L_{dn\ Build/10}$. 10^$L_{dn\ Esisting/10}$)*
	=	*68.38*
at nearest residences	=	[redacted]
$L_{dn\ (with\ warning\ horns)}$	=	*10log(10^$L_{dn\ Build/10}$. 10^$L_{dn\ Esisting/10}$)*
	=	*73.55*

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3	=	[redacted]
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3	=	67.66
L_E >77	Lp=	75		

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	[redacted] Severe Impact
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	73.73

Existing

Meaured Noise levels in dBA

Hour	Leq	[illegible]	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	79.20	79.20	83176377.11	107.7	77.7	61.5	51.5	47.1
9:00 AM	65.70	65.70	3715352.291	92.5	68.5	53.5	48.9	44.9
10:00 AM	67.80	67.80	6025595.861	93.9	78.7	54.3	48.9	45.7
11:00 AM	62.40	62.40	1737800.829	89.1	67.1	51.3	46.5	43.3
12:00 PM	73.00	73.00	19952623.15	101.5	72.3	51.9	46.5	42.9
1:00 PM	60.00	60.00	1000000	83.9	69.5	51.3	46.9	43.7
2:00 PM	67.20	67.20	5248074.602	94.3	69.5	53.1	48.5	44.9
3:00 PM	61.90	61.90	1548816.619	88.7	64.9	58.3	47.7	43.7
4:00 PM	75.10	75.10	32359365.69	103.5	77.3	60.9	55.5	51.9
5:00 PM	66.30	66.30	4265795.188	93.9	66.9	57.5	52.9	49.9
6:00 PM	76.50	76.50	44668359.22	104.1	80.1	58.9	53.3	50.1
7:00 PM	69.10	69.10	8128305.162	94.1	81.1	57.7	51.9	47.7
8:00 PM	71.10	71.10	12882495.52	94.7	82.5	55.3	49.5	46.1
9:00 PM	72.40	72.40	17378008.29	99.1	78.7	52.9	49.7	48.5
10:00 PM	66.50	66.50	4466835.922	91.9	77.5	53.1	50.3	48.7
11:00 PM	68.20	[illegible]	66069344.8	96.7	69.7	53.5	50.3	48.5
12:00 AM	66.70	[illegible]	46773514.13	93.5	74.1	54.9	51.9	49.5
1:00 AM	50.40	[illegible]	1096478.196	71.5	55.7	52.1	48.5	45.1
2:00 AM	61.60	[illegible]	14454397.71	87.3	70.7	46.1	40.7	39.1
3:00 AM	41.80	[illegible]	151356.1248	57.5	49.7	43.7	39.9	38.1
4:00 AM	72.50	[illegible]	177827941	100.9	72.3	50.5	48.7	38.3
5:00 AM	70.40	[illegible]	109647819.6	95.3	82.1	54.7	49.3	47.9
6:00 AM	75.80	[illegible]	380189396.3	103.5	78.5	50.7	48.5	40.3
7:00 AM	79.30	[illegible]	851138038.2	105.1	91.5	62.5	48.5	41.7
Sum			1893902092					
Ldn dBA			79.0					
Ldn dBA at nearest residences			77.6					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	71.75	-	-5.04	-	-1.12	- 0
	=	77.90					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.84	-	-5.04	-	-1.12	- 0
	=	85.99					

where: $L_{dn\ at\ 50\ ft}$ = 71.75 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.84 with warning horns

D=Distance ft	=	28	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 72.37

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.97

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 86.18

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	-5.04	-	-1.12	-	0
	=	81.36						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	-5.04	-	-1.12	-	0
	=	88.09						

where: $L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
D=Distance ft	=	28	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.88
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	88.21

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.21	-	-5.04	-	-1.12	- 0
	=	81.36					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	81.94	-	-5.04	-	-1.12	- 0
	=	88.09					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	28	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 81.88

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 88.21

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	78.76
at nearest residences	=	77.90 = SEVERE IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Existing/10})$
	=	83.93

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	70.62
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	75.26
L_E >77	Lp=	75		

APPENDIX C-2

AMBIENT VIBRATION MONITORING DATA

1 INTRODUCTION

Ambient vibrations measurements were made at 14 locations along the planned alignment. The vibration velocity levels were measured over a 24 hour period using a data logger using a slow rms detector. The vibrations were recorded using two methods, 1 second samples and 1 minute intervals. In general the vibration sensor was located in the building basement as near as possible to the planned alignment.

The 1 second sample data was used to identify train passes from existing rail traffic.

The 1 minute interval data was used to evaluate the overall vibration environment at each site. The interval data is presented in the accompanying figures. In the figures, L(99) is the vibration level that was exceeded 99% of the time in each interval, which is indicative of the background vibration levels (the levels that are usually present). L(50) is the vibration that is present 50% of the time. L(50) can be thought of as the average vibration level at the site. L(1) is the vibration level that is exceeded 1% of the time in each interval. L(1) is indicative of the greatest vibration levels that were measured during the interval.

These figures indicate that the vibration has a distinct day/night variation. Typically, the nighttime vibration levels are 5-10 dB lower than those measured during the daytime.

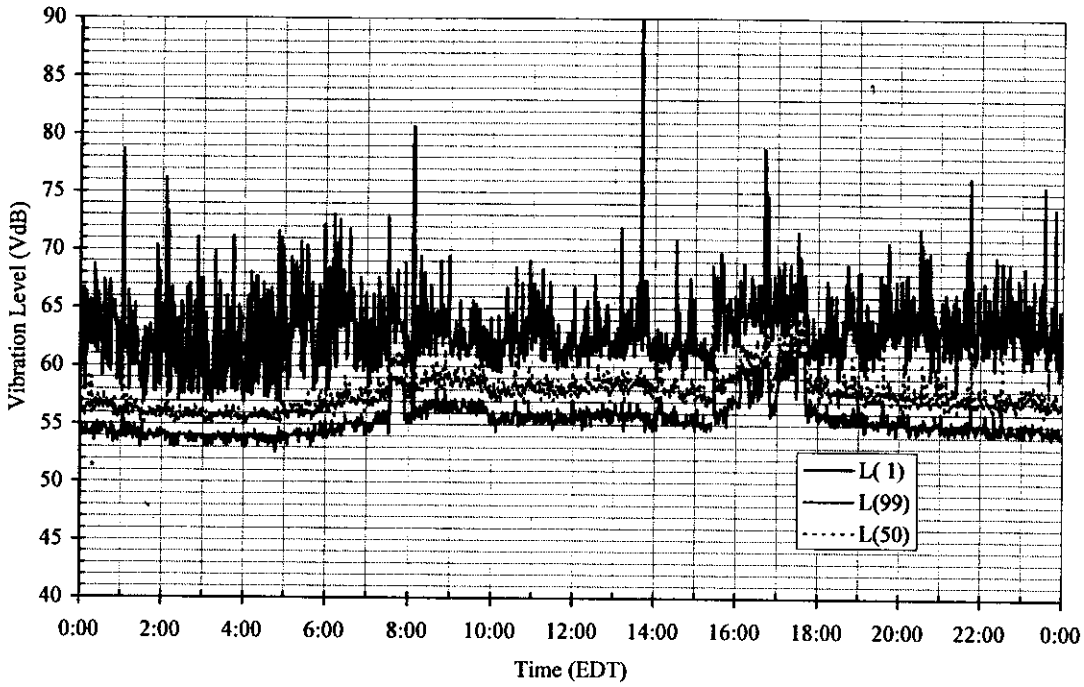


Figure A1: Ambient Vibrations - 466 Lexington Avenue - May 5-6, 1999

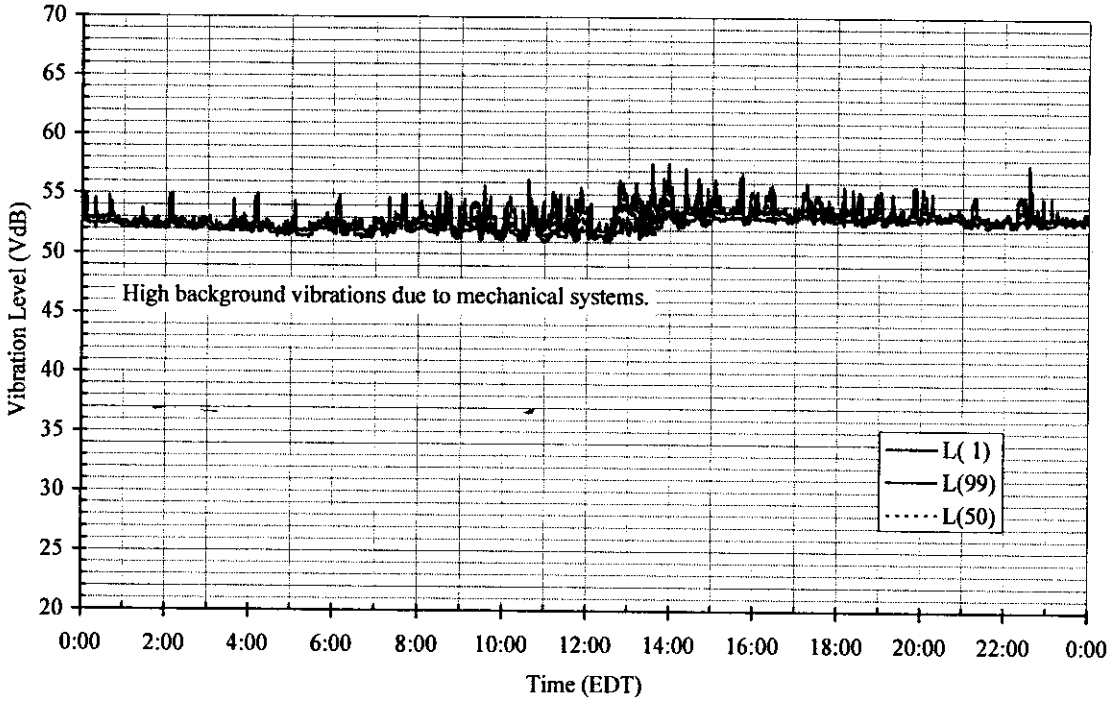


Figure A2: Ambient Vibrations - 270 Park Avenue - May 4-5, 1999

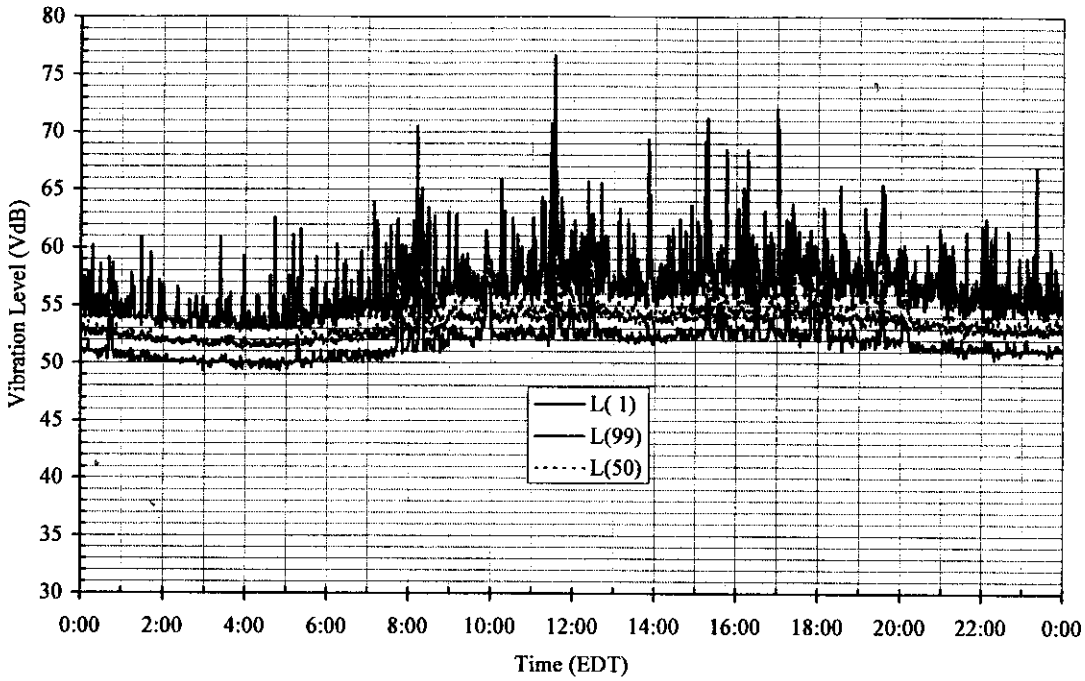


Figure A3: Ambient Vibrations - 301 Park Avenue (Waldorf Astoria) - July 27-28, 1999

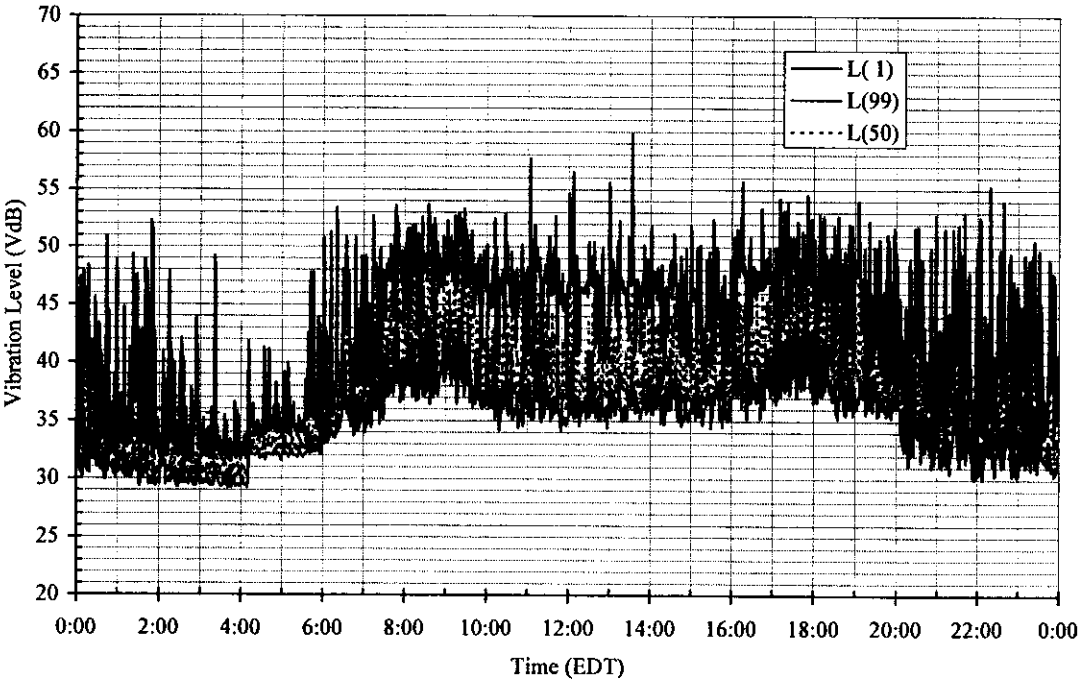


Figure A4: Ambient Vibrations - 350 Park Avenue - May 5-6, 1999

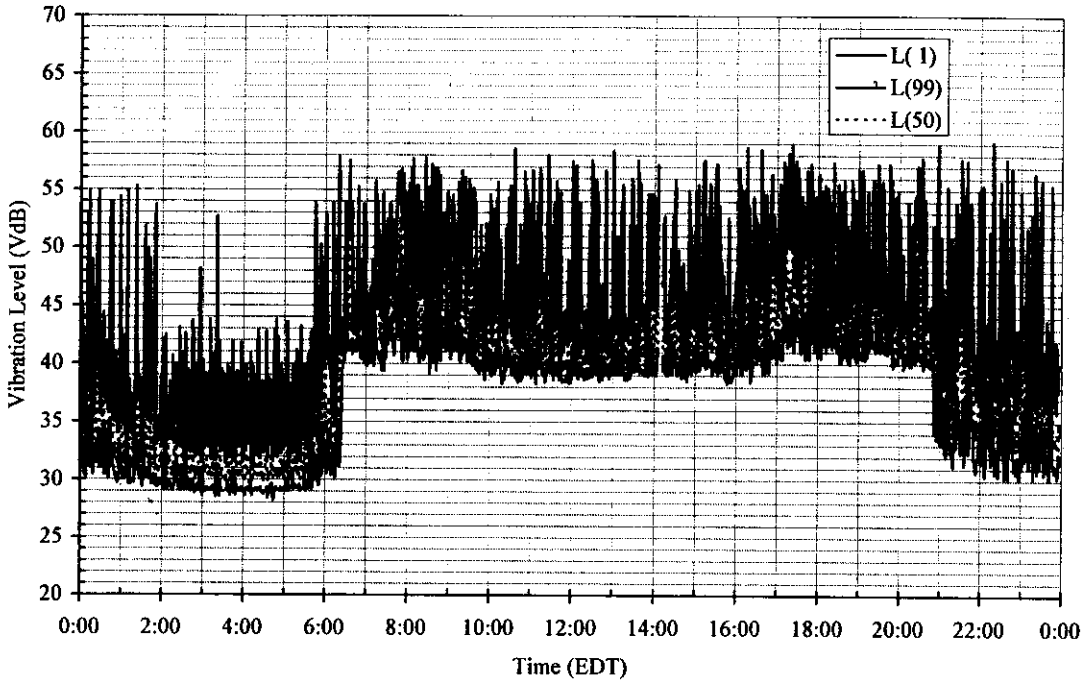


Figure A5 - Ambient Vibrations - 370 Park Avenue - May 5-6, 1999

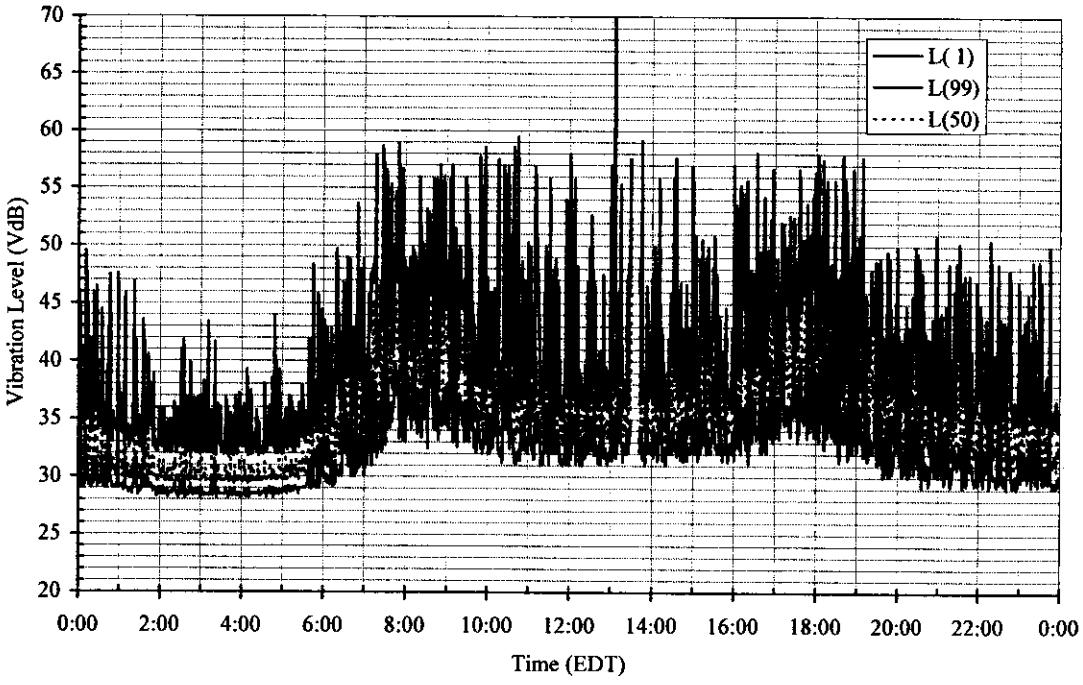


Figure A6: Ambient Vibrations - 390 Park Avenue (Lever House) - May 5-6, 1999

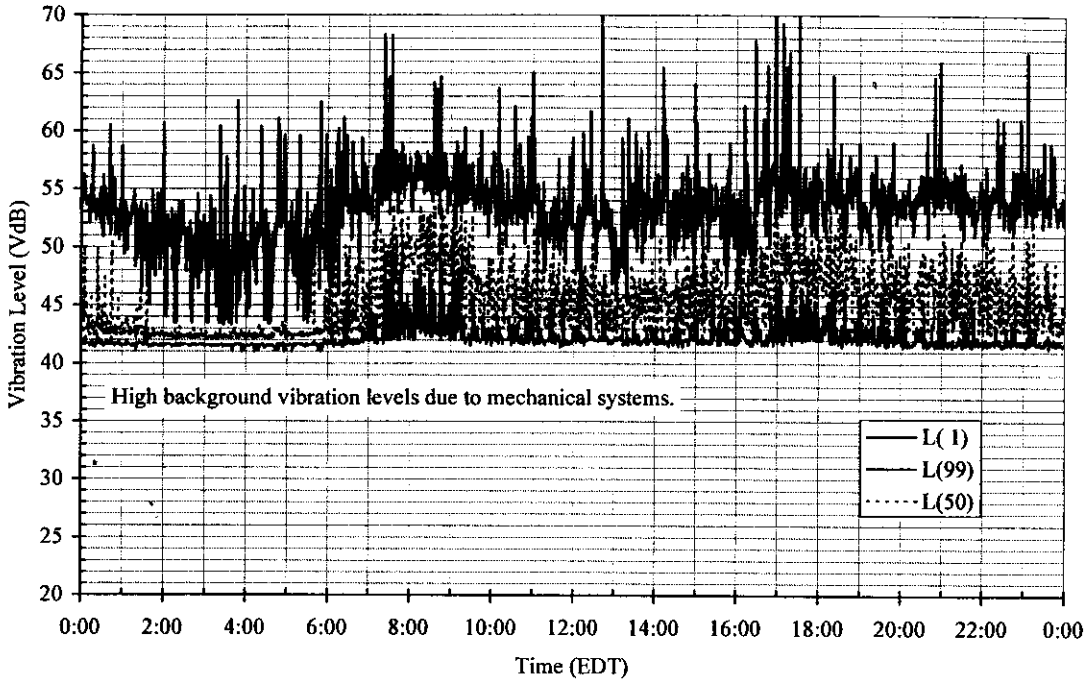


Figure A7: Ambient Vibrations - 425 Park Avenue - May 4-5, 1999

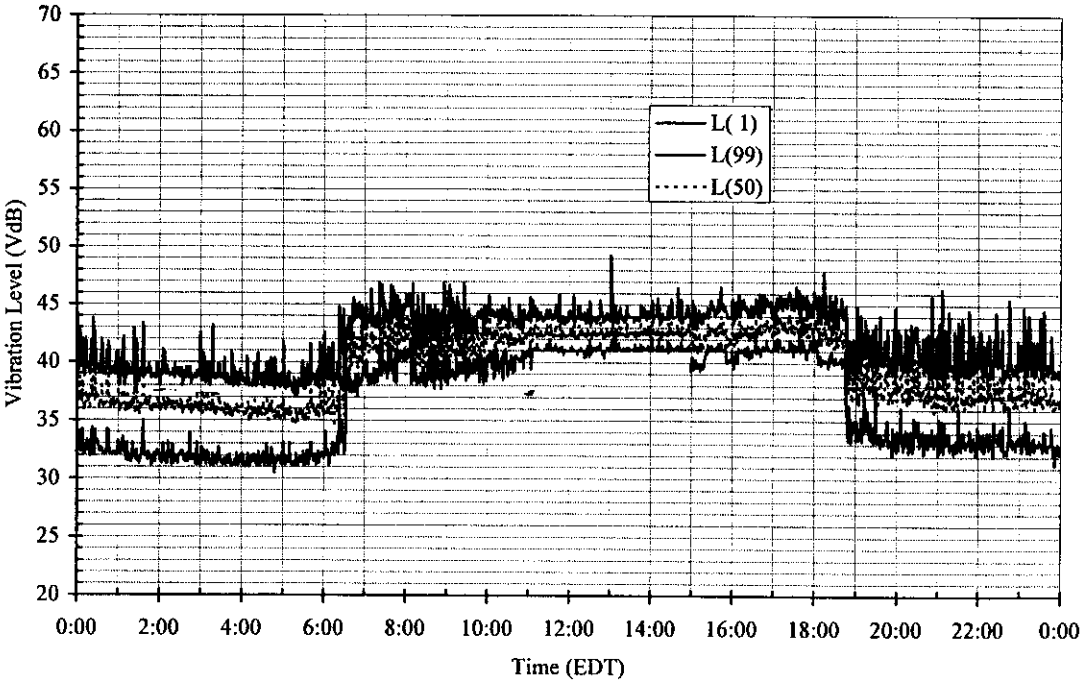


Figure A8: Ambient Vibrations - 500 Park Avenue - May 6-7, 1999

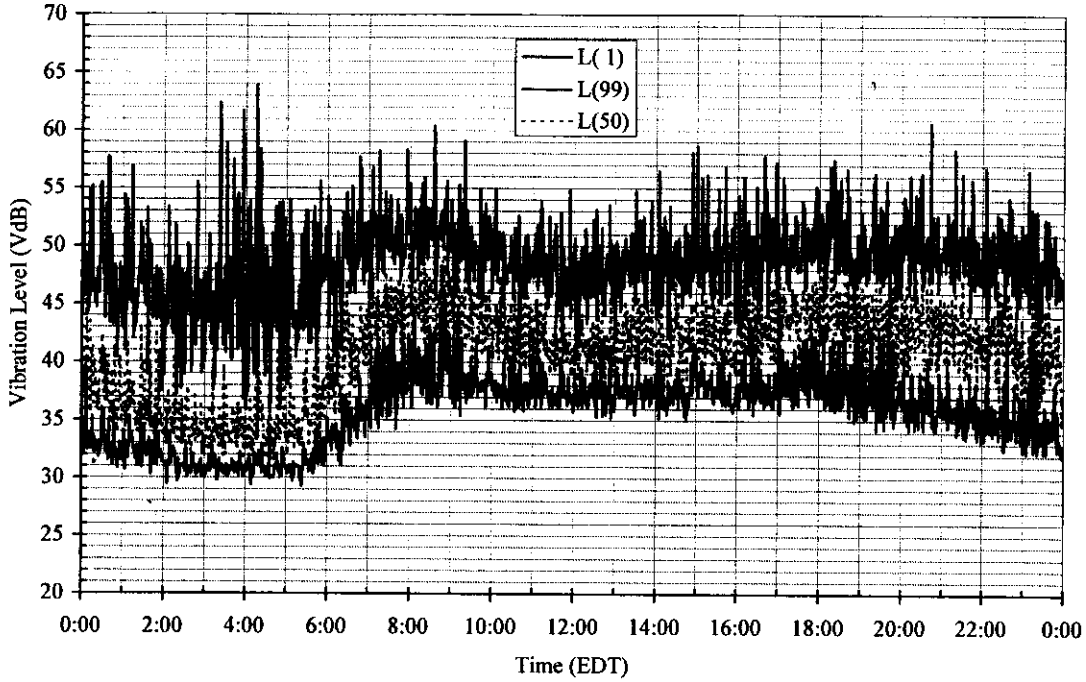


Figure A9: Ambient Vibrations - 521 Park Avenue - July 28-29, 1999

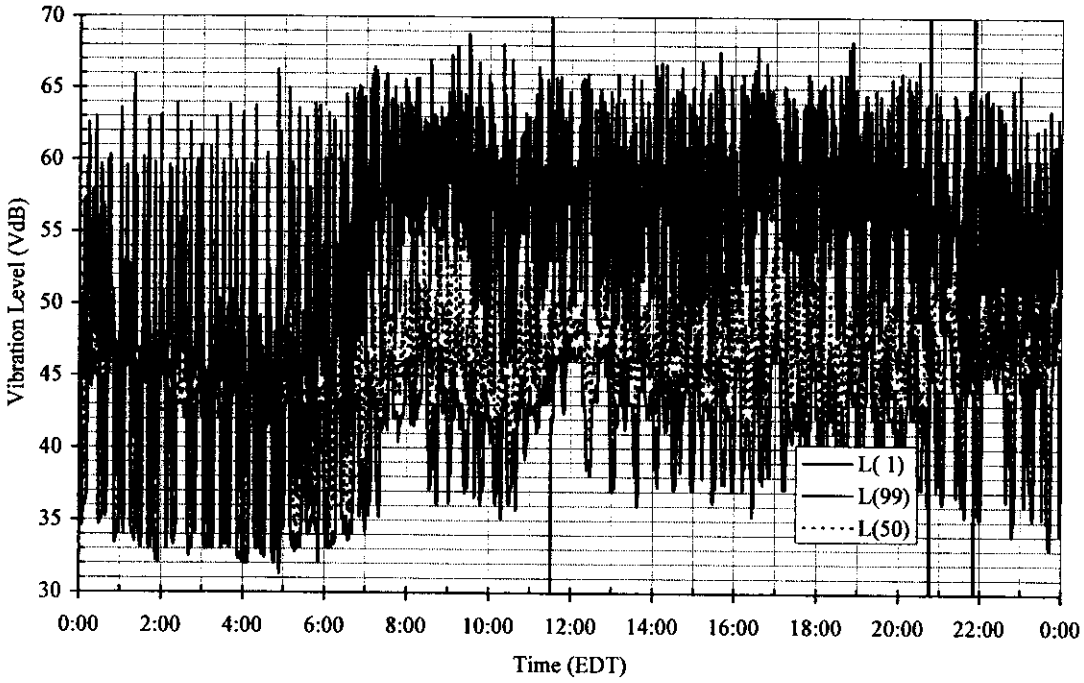


Figure A10: Ambient Vibrations - 786 Lexington Avenue - September 22-23, 1999

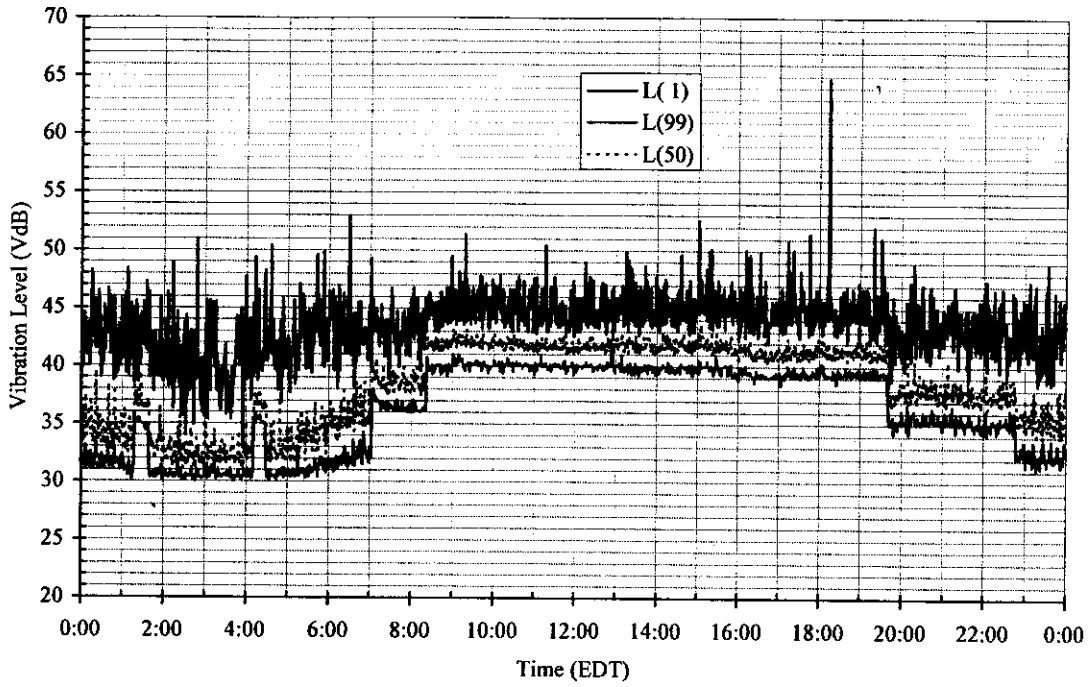


Figure A11: Ambient Vibrations - 166 East 63rd Street - May 6-7, 1999

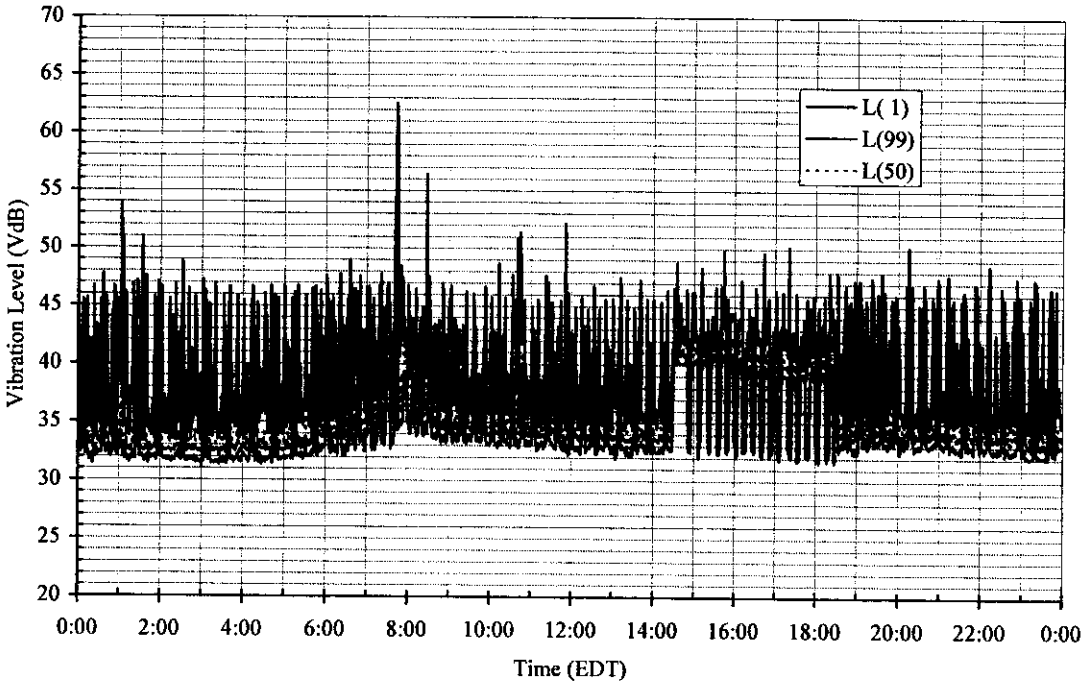


Figure A12: Ambient Vibrations - 250 East 63rd Street - May 6-7, 1999

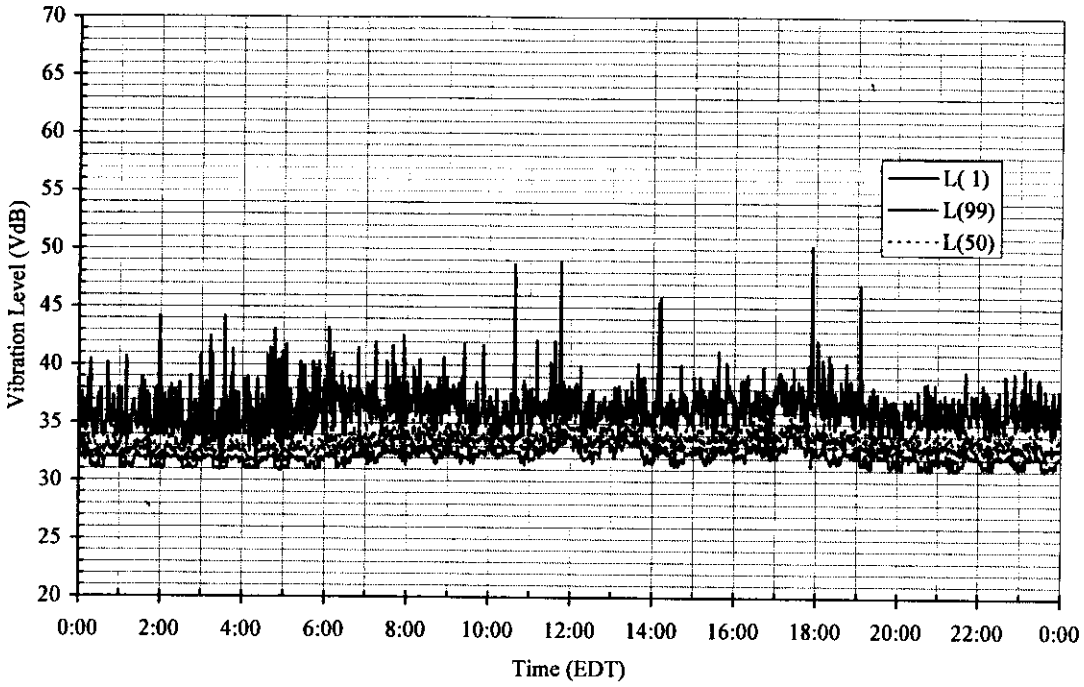


Figure A13: Ambient Vibrations - 201 East 62nd Street - May 6-7, 1999

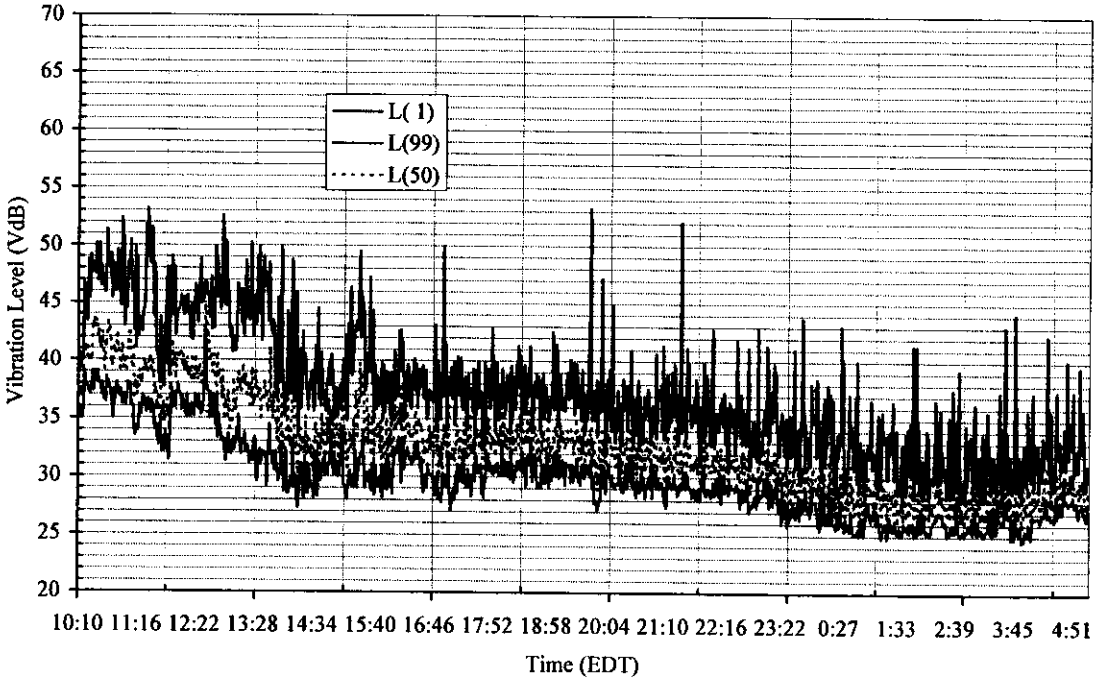


Figure A14: Ambient Vibrations - Newcomer High School - July 29-30, 1999

APPENDIX C-3

VIBRATION PREDICTIONS USING THE TRANSFER MOBILITY METHOD

1 INTRODUCTION

The propagation of vibration through the ground is a complex phenomenon that is affected by a number of factors, including; the soil type; moisture content; location of the water table; soil layering; discontinuities such as trenches or caverns; and, topography. In cases where only rough estimates of transmitted vibration are required, simple models can be used to predict propagation through the ground. The FTA general vibration assessment is an example of such a simple model. However, in cases where more precise estimates are required, or where the ground conditions preclude the use of simple models, a more rigorous approach is needed. In the present study, the complex subterranean structure on Manhattan consisting of myriad tunnels, building foundations and utility lines, suggested a rigorous approach to vibration prediction, even at the EIS stage.

Transfer mobility testing is an empirical method for measuring the vibration characteristics of the ground at a specific location. In the transfer mobility method, the vibration propagation characteristics of the ground are measured using a calibrated vibration source and an array of vibration sensors. Having determined the vibration propagation characteristics, it is then possible to predict the vibrations produced by other sources simply by comparing the new source to the calibrated source.

The improved accuracy of the transfer mobility method comes from the fact that the test vibrations travel over the same path as do the vibrations of the real vibration source, in this case, a train in a tunnel.

The transfer mobility method is described in general in Section 11 of the FTA manual. The purpose of this Appendix is to describe in detail the method and assumptions that were used in this study.

2 BACKGROUND

Most people are familiar with a time domain representation of vibration. For example, during an earthquake, the needle on a seismograph oscillates back and forth across the paper giving a time history of the magnitude of the vibrations in the ground. From a time history plot, one can readily observe the duration of the earthquake and determine the greatest magnitude of the vibrations. However, it is difficult to determine the frequency character of the vibration energy; that is, whether or not the vibration energy is comprised of slowly oscillating motions or of high frequency rapid oscillations.

Frequency domain analysis is a method used to break down the time signal into its principal frequency components. In the frequency domain, for example, it is very easy to see whether the vibration energy is predominantly low frequency, high frequency, or something in-between.

Frequency domain analysis is the backbone of the transfer mobility method. In effect, the transfer mobility measurement determines to what extent vibrations of different frequencies propagate through the ground. In fact, one way to measure transfer mobility is to simply vibrate the ground at a known frequency and measure the response. By changing the frequency of the vibrator, it is possible to obtain the ground propagation characteristics over a range of frequencies. In the present study, we used a large hammer to excite the ground. The hammer excites many frequencies at once, which speeds up the test process.

3 BASIC EQUATIONS AND DEFINITIONS

3.1 Point Source Transfer Mobility

The source-path-receiver concept applies equally well to vibration as it does to airborne noise. In this case, the vibration source is a train or piece of construction equipment; the path is the ground; and, the receiver is the occupied space where the people and/or equipment reside who may be potentially affected by the vibration.

In the frequency domain, the source, path and receiver are linked by the equation,

$$V(f) = Tm_{point}(f) * F_{point}(f), \qquad \text{(C1)}$$

where V is the vibration velocity in units of inches/second, Tm_{point} is the transfer mobility (propagation) in units of inches/second/lb_f and F is the vibrating force in units of pounds force (lb_f). The f in parentheses is meant to indicate that all three quantities are functions frequency. Equation C1 pertains to the point transfer mobility, that is the vibration that results from a point vibration source, such as a pile-driver. Similar expressions can be developed for other force distributions, such as the line-source transfer mobility to model the vibrations produced by a train.

It is common to use re-write Equation C1 using decibel notation, where the quantities are referenced to standard quantities. In decibel notation, Equation C1 becomes,

$$L_v(VdB) = TM_{point}(dB) + L_F^{point}(dB), \qquad \text{(C2)}$$

where, Lv = 20 log(V/Vref) is the vibration velocity level. Vref, the reference velocity level is equal to10^{-6} inches/second. The units of velocity level are denoted VdB to avoid confusion with acoustic decibels. TM_{point} is the point transfer in decibels referenced to 10^{-6} inches/second/lb_f. L_F^{point} is the force level in decibels referenced to 1 lb_f.

3.2 *Line Source Transfer Mobility and Force Density*

The point source transfer mobility is used to predict the vibration velocity due to a point excitation. A similar approach can be used to predict the vibration velocity due to a line source like a train. In decibel notation, the line source transfer mobility is given by,

$$L_v(VdB) = TM_{line}(dB) + L_F(dB) + C(dB), \qquad \text{(C3)}$$

where TM_{line} is the line source transfer mobility in decibels, referenced to 10^{-6} inches/second/(lb_f/ft) and L_F is the force density in decibels referenced to 1 lb_f/ft. The C term in Equation C3 is a correction factor that can account for factors such as the track fixation method and the building foundation coupling loss.

In the form presented in Equation C3, the transfer mobility and force density are used to predict the vibration level. Equation C3 can also be rearranged in order to estimate the force density of a line source,

$$L_F(dB) = L_v(VdB) - TM_{line}(dB). \qquad \text{(C4)}$$

In this form, one could estimate the strength of the line source required to produce a given vibration level over a known propagation path.

4 TEST and ANALYSIS EQUIPMENT

Figure C4.1 shows a schematic representation of the test equipment used to measure transfer mobility and force density during the present study. Each component is described in detail in the following sections.

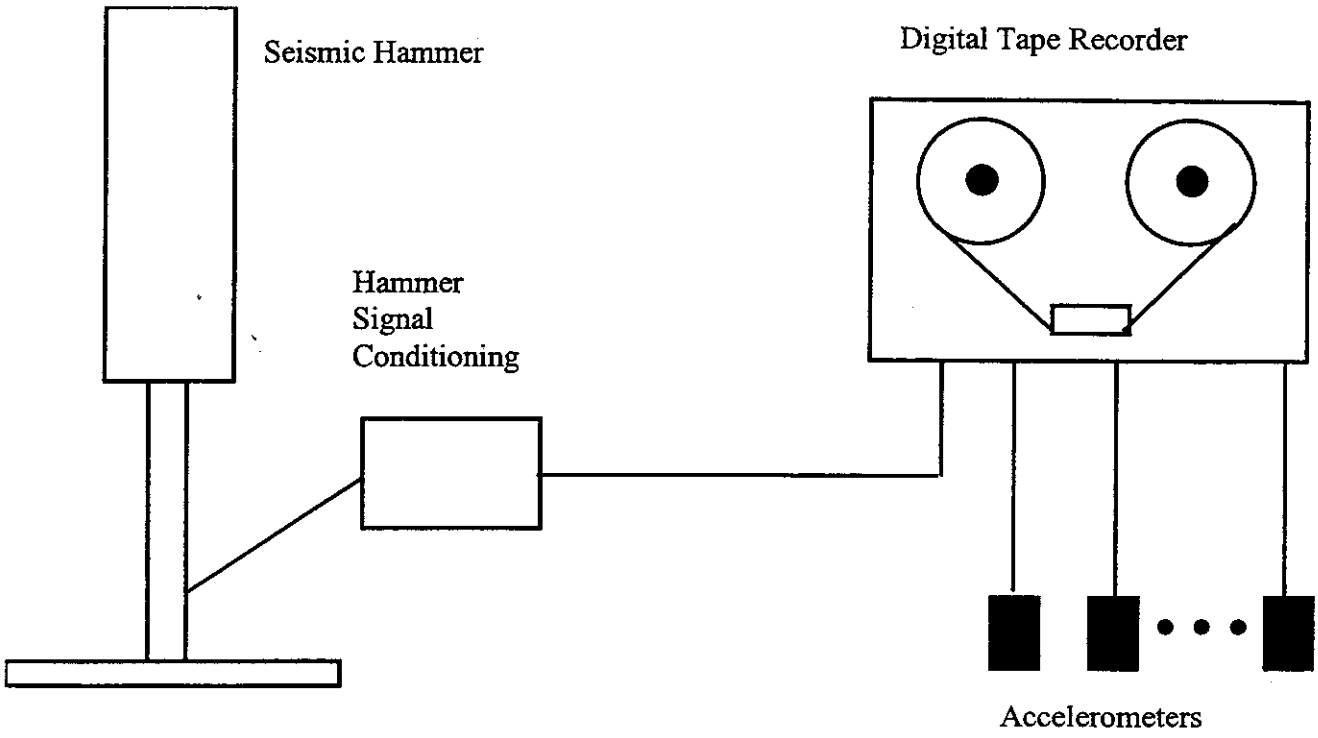


Figure C4.1 : Data Acquisition Setup

Seismic Hammer

The seismic hammer imparts a force pulse to the ground. The hammer was fashioned out of a "safety hammer" that is commonly used for soil sampling tests. The hammer consists of a 300 lbm steel mass that is dropped approximately 30 inches onto a steel anvil. A mechanical winch and quick release hook are used to lift and drop the mass. The force pulse is measured using four strain gages, configured in a full bridge arrangement that is designed to give bending and temperature compensation.

The strain gages are connected to a signal conditioning box that provides a voltage signal proportional to the applied force.

Accelerometers

The ground vibration acceleration is measured using an array of accelerometers. The acceleration data is converted to velocity as required in post processing.

Digital Tape Recorder

The hammer force signal and accelerometer response signals were recorded using a 16 channel digital tape recorder.

5 AT GRADE FORCE DENSITY TEST

The force density of a 6 car LIRR M3 train was measured on March 27, 1999. The measurements were made in a storage yard near the Belmont Park racetrack on Long Island. At this location, the alignment has 4 parallel tracks, all supported by tie on ballast. The measurements were done on Track #4.

5.1 Point Source Transfer Mobility

The point transfer mobility was measured from Track #4 to seven vibration sensors located at distances of 25', 50', 75', 100' 200' and 300' from the track centerline. The impact hammer was located on top of the ties, centered between the rails. The impact blow was centered over a single tie. The vibration sensors were attached to stakes that were driven into the ground. The vibration data was recorded as vibration acceleration.

Figure C5.1 shows a sample force pulse and the vibration response measured at the 50' sensor. In this case, the vibration pulse took approximately 50 milliseconds to reach the sensor.

Approximately 40 impacts were used to determine the acceleration/force transfer function. All of the data was tape recorded on a 16 channel digital tape recorder.

The force/response transfer functions were evaluated with a narrow band signal analyzer. The initial transfer function was determined as the ratio of the measured acceleration to the applied force. The narrow band acceleration/force transfer functions were then converted to narrow band velocity/force (transfer mobility). The narrow band transfer mobility transfer functions were then converted to 1/3 octave band by averaging the narrow band data (in each 1/3 octave band).

Figure C5.2 shows the narrow band and 1/3 octave band point transfer mobility for measured at the 100' sensor. In this case, the most efficient vibration transmission occurs between about 15 Hz and 40 Hz.

Coherence

The third trace on Figure C5.2 is the coherence of the narrow band transfer function which is an indication of the quality of the measurement. By using artificial random noise superimposed on the recorded data, it was determined that good estimates of the transfer function were possible with coherence levels as low as 0.2 (with 40 averages). As can be seen from this figure, the measured coherence was generally above 0.75 and good at high frequencies. This indicates that the seismic hammer has adequate high frequency energy content (often times when impacting

soft things like the ground, it can be difficult to produce a pulse with appreciable high frequency content) and that the high frequency portion of the transfer function has a high level of confidence associated with it.

5.2 Point Source Transfer Mobility – Attenuation with Distance

Generally, the vibrations induced by the hammer decrease with increasing distance from the source. This is caused both by geometric spreading and by energy absorption in the soil.

Figure C5.3 shows the variation of the 100 Hz point transfer mobility component with distance from the Long Island test. As the figure shows, the point transfer data has a linear dependence on the logarithm of the distance from the track. In this case, the slope of the curve is equivalent to a –9 dB drop for each doubling of distance. This is approximately –6 dB more than the theoretical –3 dB rate for surface Rayleigh waves.

A linear curve fit was used for each 1/3 octave frequency band. In cases where the coherence of the transfer function was poor, the curve fit parameters from an adjacent frequency band were used.

The curve fit coefficients for the point source transfer mobility are contained in Table C5.1.

Table C5.1 - Point Source Transfer Mobility Curve Fit Coefficients for Long Island

1/3 Octave Band Center Frequency (Hz)	a_0*	a_1*
8	28	-14
10	34	-14
12.5	58.61941	-25.00174
16	68.89712	-28.9118
20	76.34807	-32.42563
25	43.10594	-12.77196
31.5	43.10594	-12.77196
40	57.446	-23.1388
50	38.63559	-17.12976
63	38.63559	-17.12976
80	17.8855	-9.533762
100	48.37664	-29.74355
125	28.28073	-22.50879
160	32.99259	-30.7296
200	46.79834	-40.39494
250	34.96992	-38.60573
315	23.9208	-33.95278
400	21.31648	-32.83701
500	10.60994	-27.64251

* $TM_{point} = a_0 + a_1 * \log_{10}[d(ft)]$

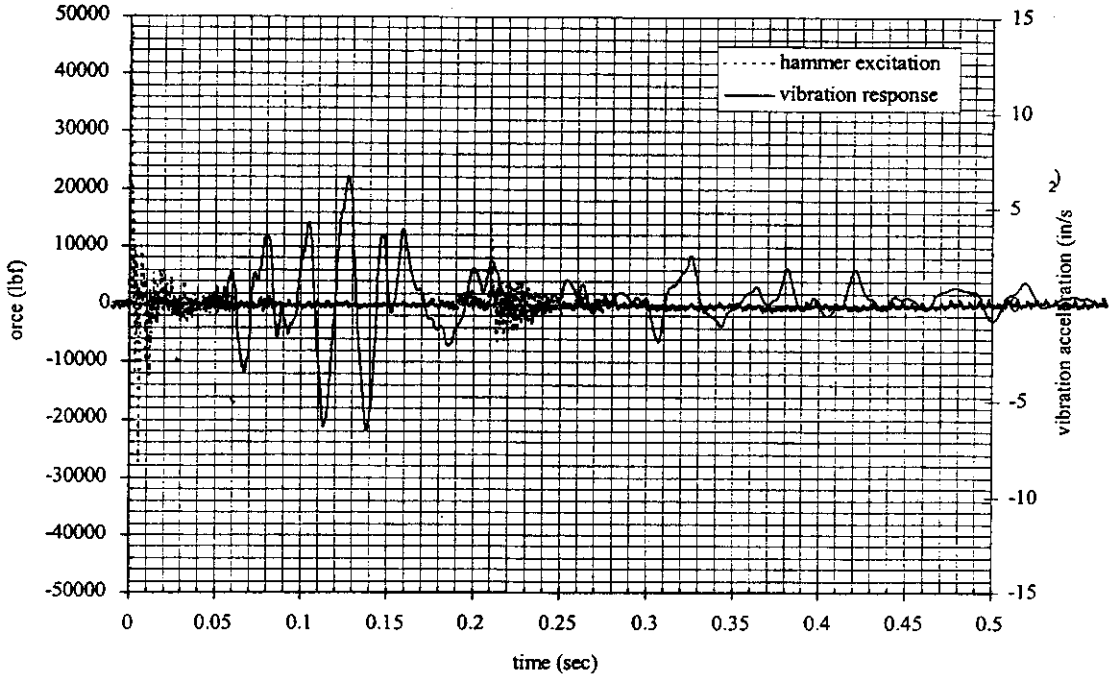


Figure C5.1: Hammer Induced Vibration Waveform at 50' Sensor

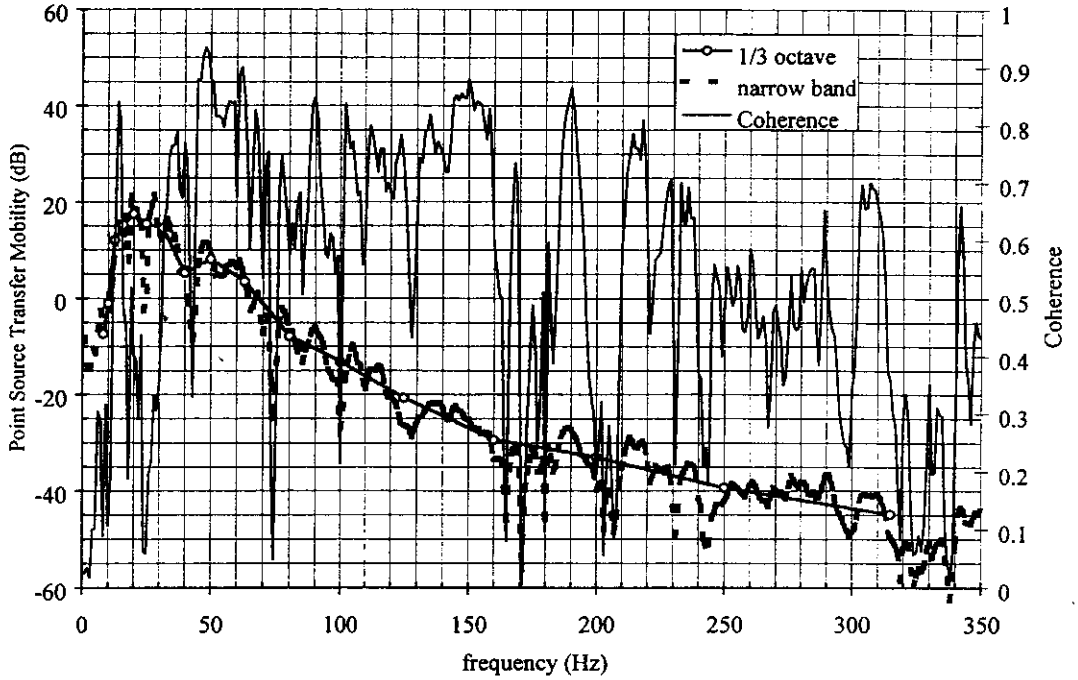


Figure C5.2: Point Source Transfer Mobility at 100 ft

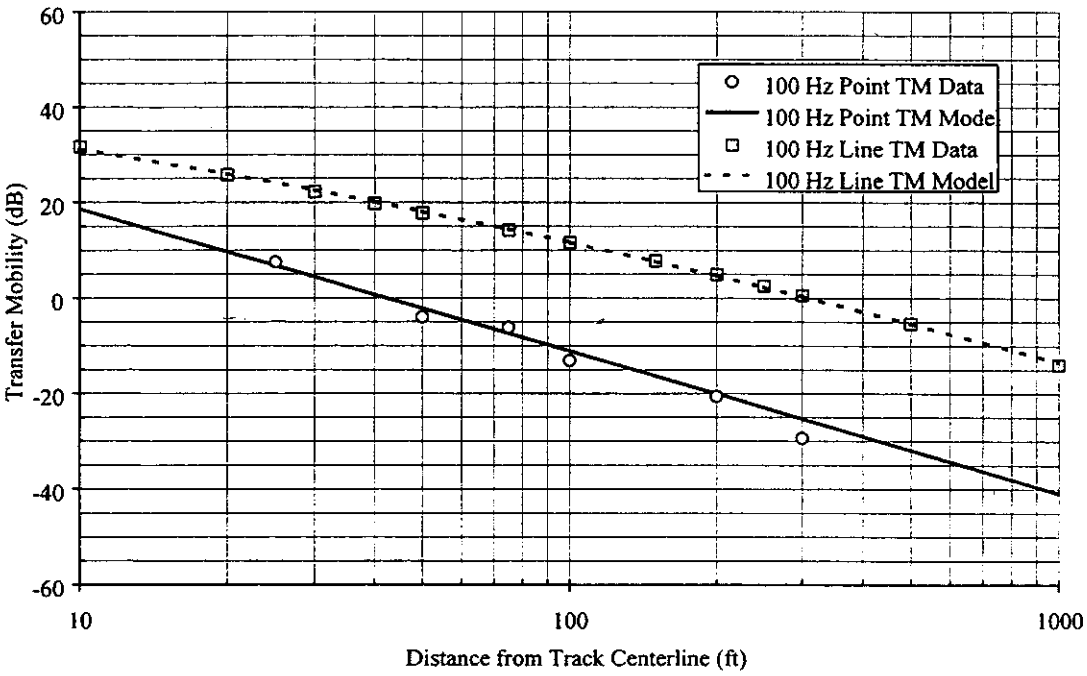


Figure C5.3: Variation of 100 Hz Transfer Mobility Component with Distance

5.3 Line Source Transfer Mobility

The test train for the Long Island force density measurements was 6 cars long (L = 510 ft). A numerical integration method was used to determine the line source transfer mobility from the point source model. The line source transfer mobility, evaluated at a perpendicular distance y_0, is given by the line integral,

$$TM^2_{line}(y_0) = \int_{-L/2}^{L/2} TM^2_{point}(y_0, x)\, dx, \qquad \text{(C5)}$$

where the point source transfer mobility is used in its dimensional form,

$$TM^2_{point}(y_0, x) = TM^2_{ref} * 10^{\frac{a_0 + a_1 \log[(y_0^2 + x^2)^{1/2}]}{10}}, \qquad \text{(C6)}$$

where, x is the distance from the center of the train, a_0 and a_1 are the linear curve fit coefficients for the point source transfer mobility, and $TM_{ref} = 10^{-6}$ in/s/lbf. Once the line source transfer mobility is calculated it can be converted to decibel notation using,

$$TM_{line}(dB) = 10 \log(TM^2_{line}) - 20\log(TM_{ref}), \qquad \text{(C7)}$$

where $TM_{ref} = 10^{-6}$ in/s/(lbf/ft).

The line source transfer mobility, calculated at discrete distances, y_0, from the track centerline is shown on Figure C5.3 for the 100 Hz 1/3 octave band. To facilitate the prediction procedure, a curve fit was also used to model the calculated line source data. In this case a quadratic model was used to fit the line source data.

5.4 Vibrations due to Train Passes

After the transfer mobility tests were done, the track was cleared and the test train was run by the test site at various speeds, 15 mph, 30 mph, 45,mph and 50 mph. At each speed, four passes were recorded, two in each direction. The train direction had no significant effect on the measured vibrations.

The 1/3 octave vibration spectrum was determined for each train pass. The spectrum was measured using the peak hold function in the spectrum analyzer. In peak hold mode, the analyzer records the maximum vibration level that occurred in each 1/3 octave band during the passby. Figure C5.4 shows the vibration spectra measured at the 100' sensor position during four train passes at 30 mph. The solid curve represents the average spectrum that was used for the analysis.

Figure C5.5 shows the variation in the 30 mph average spectra at each measurement distance. As one would expect, the vibrations decrease with increasing distance from the track. Also, one can see that the high frequency components attenuate at a faster rate than the low frequency vibrations.

Figure C5.6 shows the average vibration spectra measured at the 100' sensor for various train speeds. Interestingly, the vibration spectra are similar at frequencies between 63 Hz and 200 Hz. The greatest difference in the spectra occurs at frequencies around 20 Hz.

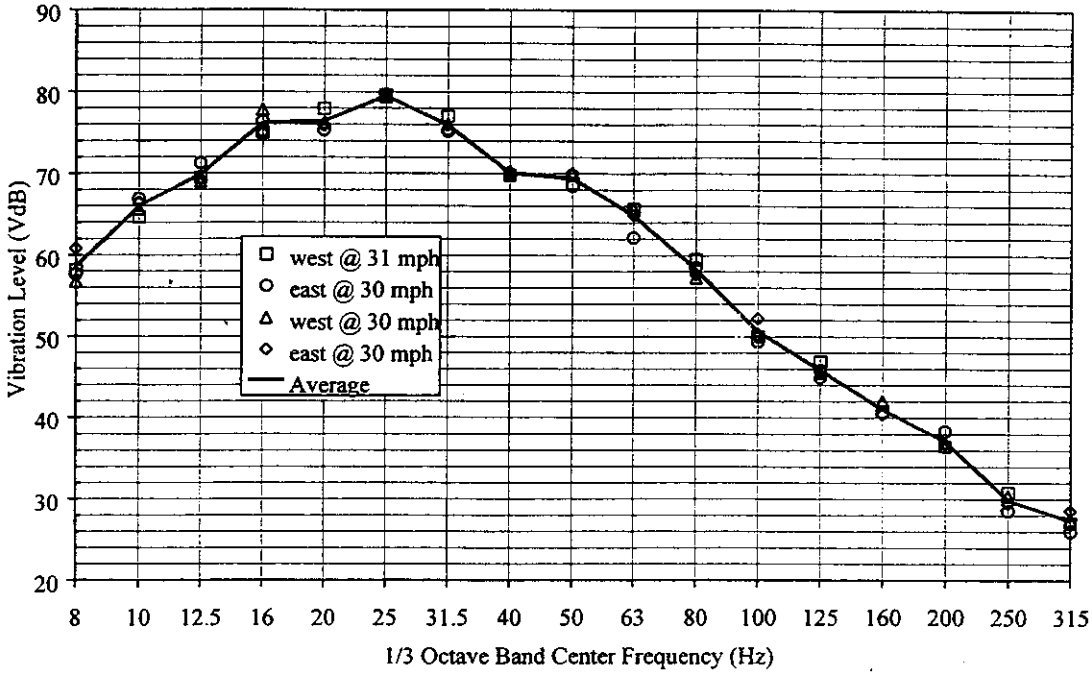


Figure C5.4: Vibration Spectra due to Train Passages at 30 mph - 100 ft Sensor

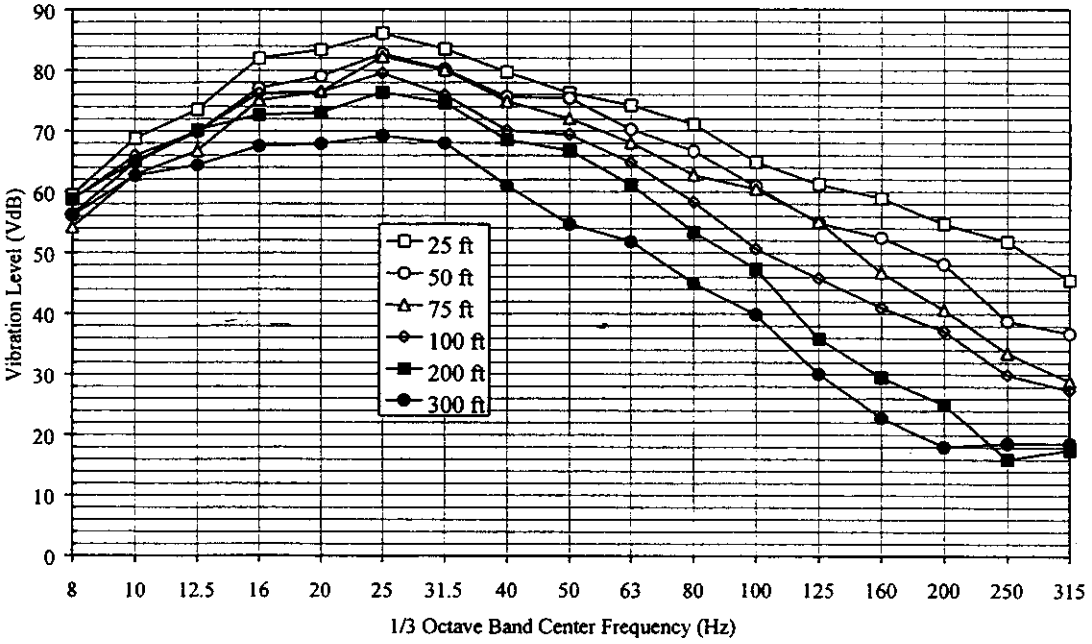


Figure C5.5: Variation of Average Vibration Spectra with Distance
for 30 mph Train Passes

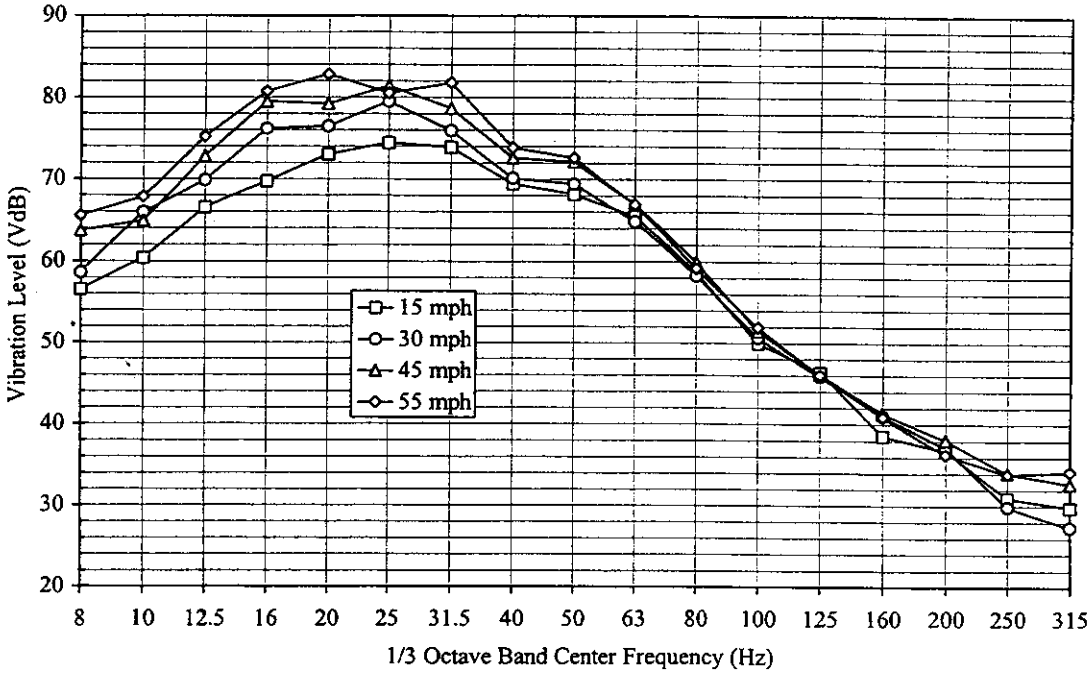


Figure C5.6: Average Train Induced Vibration Spectra - 100' Sensor

5.5 Force Density

Given the line source transfer mobilities (derived from the point source transfer mobility measurements) and the train induced vibration spectra, the line source Force Density Level (FDL) can be calculated using Equation C4.

The FDL is based on the train induced vibrations and transfer mobility at each measurement point. Because the same train is responsible for the induced vibrations at each measurement site, the FDL's from each measurement distance should be similar. Figure C5.7 shows the calculated FDL's from the 25', 50', 75', 100' 200' and 300' measurement distances for a 30 mph train speed. While there is generally good agreement between these data sets, the FDL spectra from the shorter distances (<100') are more closely grouped together. This is due primarily to higher quality (better coherence) transfer functions at the shorter distances. The average FDL was determined by a power average of the FDL's from the 25', 50', 75' and 100' sensors.

Figure C5.8 shows the average FDL calculated for the four test train speeds, 15 mph, 30 mph, 45 mph and 55 mph. In general, the FDL increases with train speed, although in the frequency band between 63 Hz and 123 Hz, the FDL's are all very similar.

Comparison of FDL to other Data

In the present project, the FDL's were based on a transfer mobility measurement referenced to the top of the tie. Other researchers reference FDL to the ground; that is they measure the transfer mobility by impacting the ground beside the alignment. Each method is equally valid, provided the FDL's are used correctly. At frequencies below the characteristic resonance of the wheel truck on the track support, both methods will predict the same FDL. However, at high frequencies, the tie based method will give a higher FDL than will the ground referenced method. This can be shown using relatively simple lumped parameter models. Therefore, it is not unreasonable that the FDL's shown appear to have more high frequency content than those determined using a ground based approach. Again, the final answers (the predicted vibration level at the location of the proposed alignment) should be the same provided the data is used correctly.

6 PREDICTED VIBRATION LEVELS

The vibration levels in Manhattan and Queens can be predicted according to Equation C3 using the force density levels and the measured transfer mobility data Manhattan and Queens.

6.1 Point Source Transfer Mobility Locations

The point source transfer mobility was measured at 5 locations on Manhattan; 52nd Street near Park Avenue (May 17, 1999); 47th Street near Lexington Avenue (loop track area, May 18,

1999); the Manhattan end of the 63rd Street tunnel near 2nd Avenue (June 3, 1999); 61st Street near Park Avenue (July 28, 1999); and, 57th Street near Park Avenue (September 17 & 18, 1999). The measurements at 52nd Street and the Loop track were done on existing track structure. The 63rd Street tunnel measurements were done on the existing tunnel invert (there are no tracks at the present time). The measurements at 61st Street and 57th Street were made using boreholes; the 61st Street borehole test was done at a 125' depth and the 57th Street test was done at two depths, 52' and 114'.

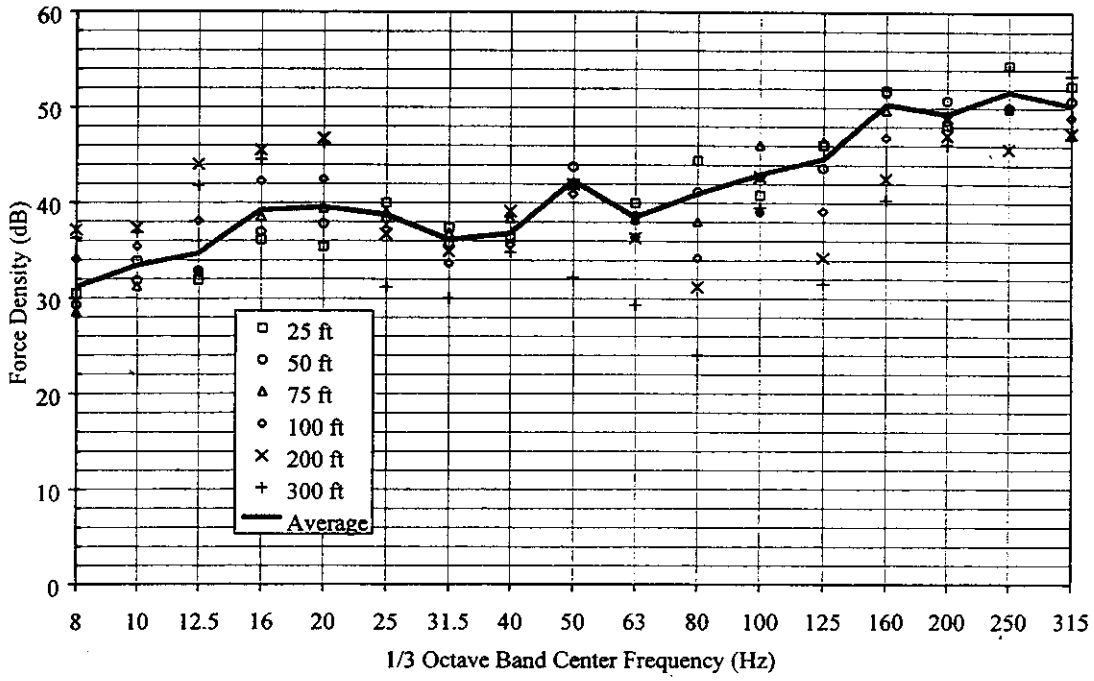


Figure C5.7: Calcualted Force Density Level at 30 mph

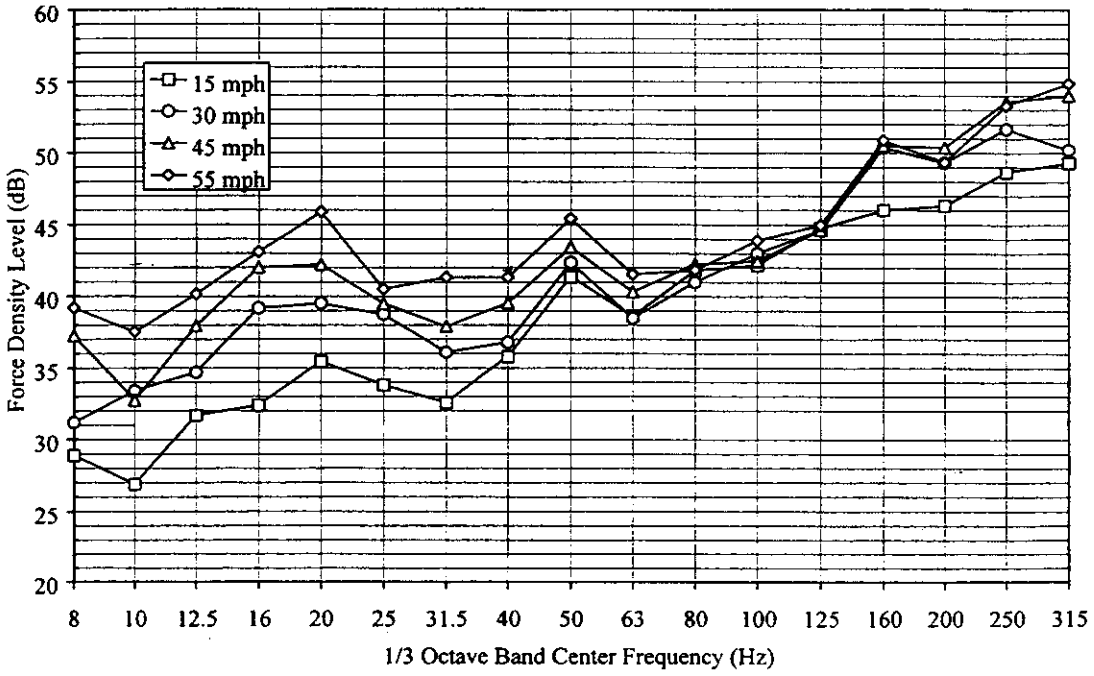


Figure C5.8: Variation of Force Density Level with Speed

In Queens, the transfer mobility was measured at the Queens end of the East River tunnel near the ventilation shaft at Vernon Boulevard (June 2, 1999).

No data was taken at the 63rd Street tunnel in Manhattan due to very poor signal to noise ratios. The tunnel is approximately 156' deep at this point.

6.2 Point Transfer Mobility Test Method

At the three borehole sites (61st Street, 57th Street - 2 depths) a downhole force sensor was used to measure the force imparted to the ground at the bottom of the borehole. The sensor was attached to the end of the drill stem and lowered to the bottom of the hole. The seismic hammer was attached to the top of the drill stem and was used to impart the impact excitation. The transfer functions were based on the force signal from the downhole sensor, although the force signal from the seismic hammer was also recorded. The cable from the downhole sensor passed through the center of the drill stem which minimized cable abrasion during testing. For the borehole tests, the drill rig was used to lift and drop the 300 lbm seismic hammer weight. Approximately 150 impacts were recorded during each borehole test. The transfer functions were based on the best 100 impacts.

The full seismic hammer rig with gantry and electric winch (to lift the weight) was used in the other locations.

6.3 Point Source Transfer Mobility Data

In general, the quality of the transfer mobility measurements was not as high in Manhattan and Queens as it was on Long Island, due to the depth of the impact point and the relatively high ambient vibrations levels. The same difference in propagation that will cause the below-grade trains to be less intrusive than trains at-grade (at the same slant distance from the track), also makes it more difficult to measure the transfer mobility transfer function.

Figure C6.1 shows the transfer mobility that was measured at the 57th Street borehole (52' depth) at a distance of 88' (102' slant). The coherence was generally not as good as it was on Long Island, although between 130 Hz and 170 Hz it approached 0.7, which is remarkable given the high ambient vibration levels in New York City. The transfer mobility expressed in 1/3 octave bands is also shown on the figure.

Figure C6.2 shows the variation in transfer mobility at the 57th Street borehole with slant distance from the impact point at the bottom of the hole. As the figure shows, as with Long Island, a linear model accurately fits the data. The line source TM for a 12 car train is also shown on the figure.

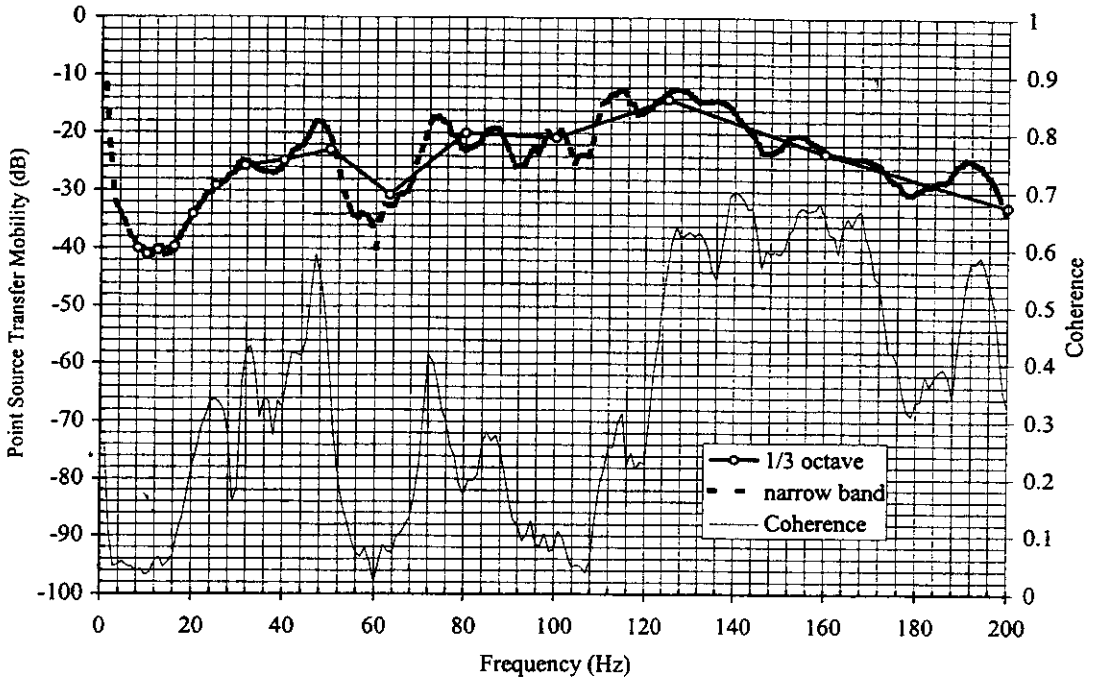


Figure C6.1: Point Transfer Mobility at 88' - 57th Street Borehole, 52' Deep

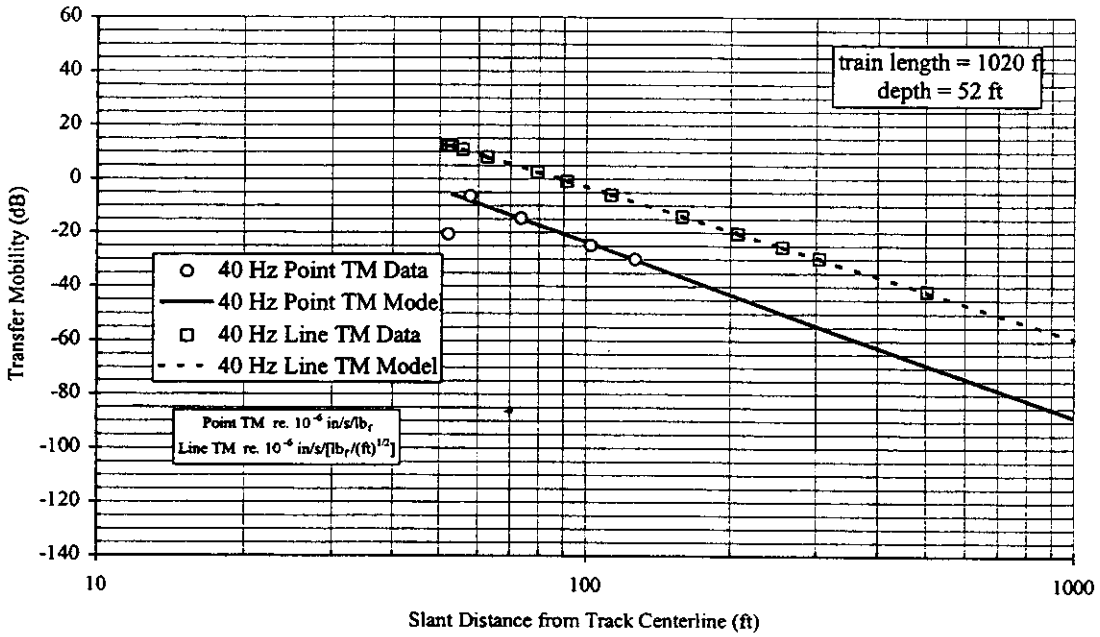

Transfer Mobility (dB)
Slant Distance from Track Centerline (ft)
train length = 1020 ft
depth = 52 ft
40 Hz Point TM Data
40 Hz Point TM Model
40 Hz Line TM Data
40 Hz Line TM Model
Point TM re. 10⁻⁶ in/s/lbf
Line TM re. 10⁻⁶ in/s/[lbf/(ft)^1/2]

Figure C6.2: Line Source and Point Source Transfer Mobility
57th St. Borehole 52' Deep

Linear polynomials were also sufficient to model the point source data for the other Manhattan test locations. In Queens, however, a quadratic model was required to capture the relatively low TM directly above the tunnel.

The general form of the polynomial curve fit to the point source TM data is,

$$TM_{point}(dB) = a_0 + a_1 \log(d_{slant}) + a_2 * [\log(d_{slant})]^2 , \qquad \text{(C8)}$$

where d_{slant} is the slant distance from the impact point to the measurement point on the surface. The curve fit coefficients for the various test locations are summarized in Table C6.1.

When performing the curve fits, if the coherence was poor for a given 1/3 octave-band frequency, then the coefficients from an adjacent band were used.

The point source transfer mobility models were used in a numerical integration routine to calculate the line source transfer mobility at a given distance from the track, for each 1/3 octave band frequency. Again, to facilitate the prediction procedure, a quadratic polynomial was used to model line source TM as a function of slant distance from the track. A 12 car train (1020') was used to calculate the line source TM.

Figure C6.3 compares the 40 Hz line source transfer mobilities models for each test location. The figure shows a number of interesting aspects about the TM models:

1) The highest TM levels (and most efficient vibration propagation) were recorded on Long Island. This would be expected since vibration sources located on the surface of an elastic half-space generate Rayleigh waves which propagate efficiently along the surface.

2) There is a dramatic difference in the 52nd Street, Loop Track and 57th Street borehole models, even though all three tests were done at approximately the same depth below the surface. The differences can be attributed to the extensive underground structure that was present at 52nd Street and the Loop track. The underground structure creates a unique and complicated path for the vibration energy. Because of this contamination effect from the underground structure, it was decided that the 52nd Street and Loop track data would not be used.

3) The TM attenuation rate with distance increases as the depth of the test point increases.

4) The deeper hole does not necessarily produce lower TM at the same slant distance. Consider the 57th Street borehole for example, the TM directly above the impact point for the 114' deep hole is higher than the TM for the 52' deep hole, 101' away (same slant distance). This suggests that, at this frequency at least, horizontal distance from the impact point is more important than depth for vibration attenuation.

Table C6.1 - Point Source Transfer Mobility Curve Fit Coefficients for Entire Project

Frequency (Hz)	52nd Street depth = 46.5'		47th Street (Loop) depth = 45'		61st Street depth = 125'		57th Street depth = 52'		57th Street depth = 114'		Queens depth = 84'		
	a_0	a_1	a_0	a_1	a_0	a_1	a_0	a_1	a_0	a_1	a_0	a_1	a_2
8	-19.022	-12.553	-6.375	-14.109	260.675	-128.474	75.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
10	40.330	-43.617	-6.375	-14.109	260.675	-128.474	75.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
12.5	41.938	-42.370	-6.375	-14.109	260.675	-128.474	75.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
16	23.111	-29.810	-6.375	-14.109	260.675	-128.474	76.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
20	25.820	-28.577	-6.375	-14.109	256.228	-126.542	80.0	-55.314	128.0	-70.0	-142.136	133.024	-36.241
25	-8.853	-9.852	-6.375	-14.109	256.228	-126.542	85.129	-55.314	132.0	-70.0	-142.136	133.024	-36.241
31.5	-9.096	-8.555	-6.375	-14.109	256.228	-126.542	125.276	-73.272	138.0	-70.0	-142.136	133.024	-36.241
40	12.273	-13.434	-6.375	-14.109	256.228	-126.542	106.152	-64.848	135.0	-70.0	-142.136	133.024	-36.241
50	11.865	-10.629	-6.375	-14.109	124.806	-70.509	61.004	-40.340	135.0	-62.62	-142.136	133.024	-36.241
63	29.601	-20.928	3.142	-19.673	98.044	-61.225	69.0	-44.121	116.0	-62.62	-313.593	284.317	-68.560
80	2.109	-10.622	22.651	-31.141	98.044	-61.225	69.0	-44.121	116.0	-62.62	-486.816	437.464	-99.710
100	24.458	-25.503	20.686	-29.597	219.944	-120.249	71.953	-44.121	118.0	-62.62	-353.389	323.065	-75.272
125	57.408	-47.914	22.472	-30.101	186.370	-105.942	71.953	-44.121	112.0	-62.62	-353.389	323.065	-75.272
160	94.230	-67.135	28.596	-33.709	186.370	-105.942	41.296	-31.763	106.406	-62.62	-484.662	406.119	-90.667
200	132.851	-91.117	28.779	-34.281	186.370	-105.942	42.853	-36.963	106.406	-62.62	-200.258	166.050	-41.731

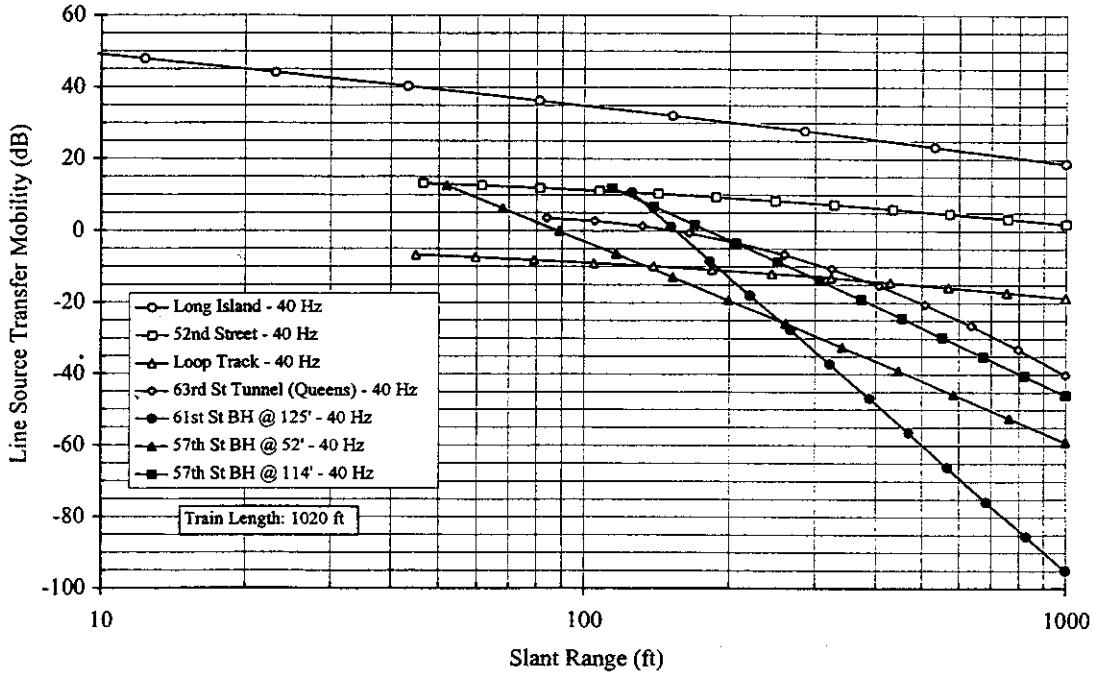


Figure C6.3: Comparison of Line Source Transfer Mobility Models - 40 Hz

6.4 *Track Support Correction to the Force Density Level*

The wheel/rail interaction is responsible for the vibration forces that propagate through the rail, the rail trackbed and then into the ground. The forces produced by the wheel/rail interaction is primarily dependent on the quality of the running surface where the wheel meets the rail. Smooth wheels and rails produce much less vibration than wheels with flat spots running over jointed track, for example. Another important factor that affects the vibration level is the track support system. Rails that are rigidly supported produce more vibration than those with resilient track supports. Reference 3 states that groundborne vibrations are directly proportional to the track support modulus, so the difference in the vibration level (and hence the force density level) between two track support conditions is,

$$\Delta FDL\ (dB) = 20 \log(\frac{k_1}{k_2}), \qquad \text{(C9)}$$

where k_1/k_2 is the ratio of the two support moduli.

Because the Long Island force density test was done with a tie on ballast support system, while the project will use direct fixation on concrete, a track support correction has to be introduced to account for the differences in the track support modulus. According to Reference 3, the difference between direct fixation and tie on ballast track supports is approximately 17 dB. However, recent test data from the Bay Area Rapid Transit system (BART) has indicated that tie on ballast is stiffer than first thought and a 7 dB correction is more appropriate. A 7 dB correction has been used for the present project.

A simple lumped parameter model can be used to show that the 20 log(k) relationship only holds above the primary resonance associated with the wheel truck mass and the driving point impedance of the rail. The BART data suggests that this characteristic frequency is around 20 Hz. Therefore, in the present analysis, the 7 dB correction has only been added for frequencies of 20 Hz and above.

6.5 Building Response Corrections

The Manhattan and Queens transfer mobility measurements were made with respect to vibration levels at street level, not in specific buildings. The FTA[1] manual provides standard correction factors, termed coupling loss factors, that adjust the predicted vibration levels based on the size of the building. The FTA factors are specified for buildings founded in soil. Generally, the more massive the building, the larger the vibration reduction factor. For buildings founded on rock, as are most of the large buildings along Park avenue, the FTA manual states that a coupling loss factor of zero should be used.

In the present study, a number of 24 hour vibration measurements were made in some large buildings along Park Avenue. A number of train passbys were included in these measurements. Figure C6.4 shows the vibration time history for a few such events that were recorded at 350 Park Avenue. In this example, the train passages are approximately 1 minute in duration. Table C6.2 summarizes the maximum vibration levels that were recorded in large buildings due to train passages. These measured levels were compared to the predicted vibration levels generated by the Manhattan model. For the predictions, a 50' setback from the tracks was assumed and the track depth was taken to be 52'. The train speeds were assumed to be 15 mph or 30 mph, depending on the location relative to Grand Central Terminal. The predicted vibration levels also appear in Table C6.2.

Keeping in mind that the LIRR trains (used for the predictions) are different from the Metro North trains that were measured, it seems evident from Table C6.2 that the model over-predicts the vibration levels in very large buildings. For this reason, a –12 dB building correction was used for buildings that are 5 or more stories tall.

The –12 dB correction is not a coupling loss per se, but can be thought of as an adjustment that is required to correct the street level vibration predictions to the actual vibrations measured in the building basements.

6.6 Track Depth Corrections

On Manhattan, borehole transfer mobility data was collected for test depths of 52' (57th Street), 114' (57th Street) and 125' (61st Street). A linear interpolation procedure was used to predict the vibrations for depths in between these test points. For depths greater than 125', the data at 125' was used for the prediction. For depths shallower than 52', the linear interpolation between 52' and 114' was projected past 52'.

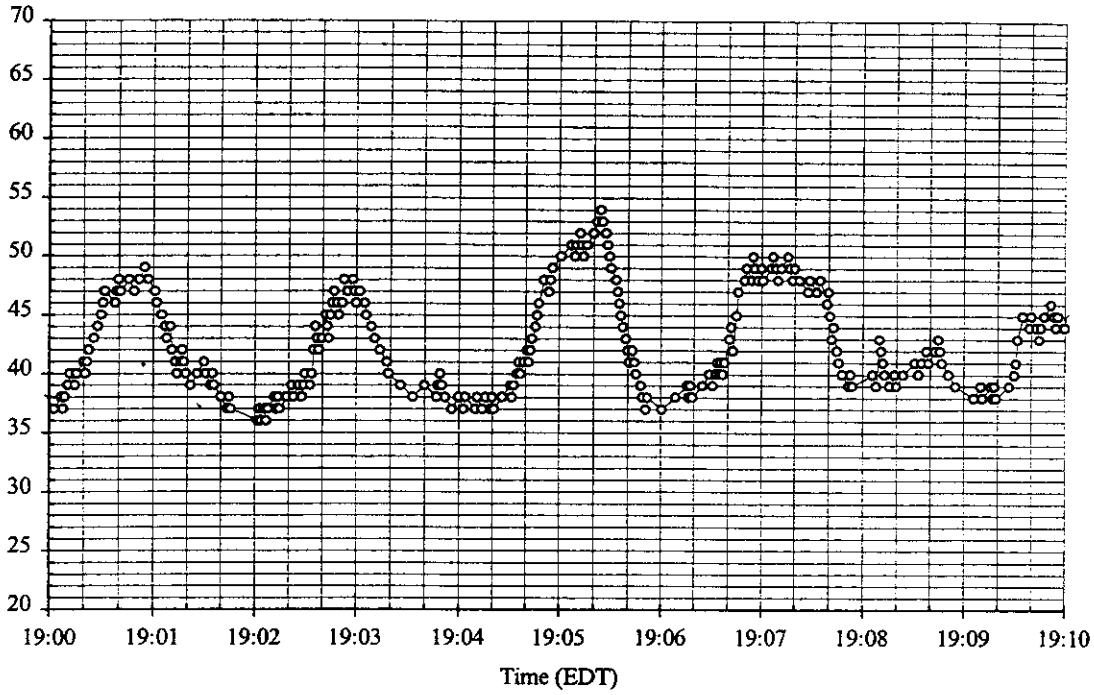


Figure C6.4: Vibration Time Histories at 350 Park Avenue - May 5-6, 1999

Table C6.2 - Vibration Correction Factors for Large Buildings

Property	No. Stories	Cross Street	Track Depth (ft)	Train Speed (mph)	Predicted Vibration (VdB)	Measured Vibration (VdB)	Correction (dB)
270 Park	52	48	52	15	66.1	55	-11.1
301 Park (Waldorf)		49	52	15	66.1	60	-6.1
350 Park	31	51	52	15	66.1	55	-11.1
370 Park	5	53	52	30	67.2	58	-9.2
390 Park (Lever)	22	54	52	30	67.2	57	-10.2
425 Park	31	55	52	30	67.2	60	-7.2
500 Park	11	59	52	30	67.2	45	-22.2
521 Park	12	60	52	30	67.2	60	-7.2
466 Lexington (Loop)	21	46	52	30	67.2	65	-2.2
786 Lexington	4	55	52	30	67.2	67	-0.2
166 E 63rd	4	Lexington	52	30	67.2	42	-25.2
201 E 62nd	20	3rd ave	52	30	67.2	42	-25.2
250 E 63rd	21	2nd ave	52	30	67.2	45	-22.2

In Queens, only 1 test depth was measured, 84'. To extrapolate to other depths, an adjustment factor of -0.07 dB/ft was used. This factor was determined based on the predicted vibration levels in Manhattan at 52' and 114' depth, directly above the alignment (0' map range). The –0.07 dB/ft adjustment factor corresponds reasonably well to the theoretical attenuation rate of –0.17 dB/ft for Rayleigh waves in an elastic half-space.

6.7 Special Trackwork Corrections

The FTA manual recommends adding 10 dB to the vibration predictions for special trackwork such as crossovers. Reference 3 indicates that the 10 dB correction is appropriate for a slant distance of 30' from the track. For distances greater than 30', a r^{-1} attenuation referenced to 30' was used.

6.8 Worn Wheels/Rails

No specific adjustment is used for worn wheels and rails. However, spectral analyses for the Long Island test were conducted using the peak hold feature that is typically 5 dB higher than the corresponding RMS value. This 5 dB "safety factor" was retained in the analysis to account for future worn wheels/rail.

6.9 Floor to Floor Attenuation

Since the lowest occupied level in the building was generally not known, no additional adjustments were made to account for floor to floor attenuation.

6.10 Groundborne Noise

According to FTA procedure, the A-weighted groundborne noise levels were calculated by subtracting 20 dB from the predicted vibration level for each building.

6.11 Prediction Procedure Flow Chart

Figure C6.5 depicts the steps that were taken to generate the estimated vibration and noise levels.

Building Data

In the GIS database, a point was placed at the approximate geometric center of each building in the study area. This point was used to calculate the distances to each of the tracks and to the trackwork locations. Each point carried the unique property ID associated to it in the database. The unique ID was used to lookup the number of stories and building classification in the GIS database.

Track Iteration Loop

The following steps were taken for each track in the database. This was particularly necessary in Manhattan because of the complex routing of the alignment for Option 1.

Track Data

The track routings in the data base were first broken up into small segments where each segment was assigned a depth and train speed. The GIS program was then used to calculate the map distance to the closest track segment for the particular track being analyzed. The GIS program also recorded the track depth and the train speed.

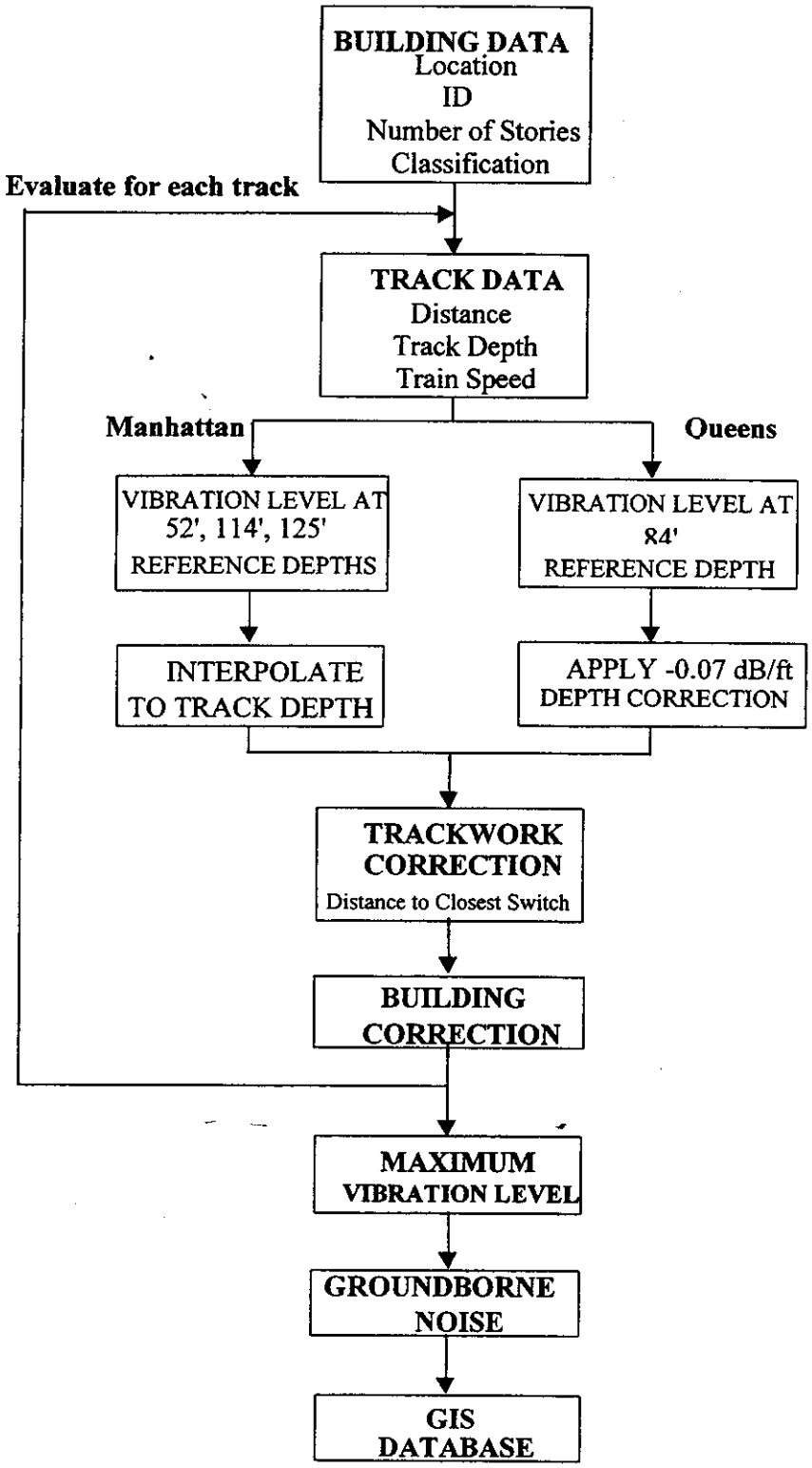


FIGURE C6.5: Groundborne Vibration and Noise Prediction Procedure

Vibration Level

The predicted ground vibration spectrum was calculated using the line source transfer mobility models and the force density spectrum corresponding to the train speed.

On Manhattan, the vibration spectra were calculated for the three reference depths (52', 114' and 125') using the calculated map range from the GIS. The overall vibration level was then calculated for each reference depth by summing the contributions from the individual 1/3 octave bands. The vibration level for the property was then calculated by interpolating between the reference levels. For track depths less than 114', the 52' vibration level and the 114' level were used to interpolate the level; for depths between 114' and 125', the vibration levels at 114' and 125' were used; and, for depths greater than 125', the vibration level at the 125' depth was used.

In Queens, the vibration spectrum was calculated for an 84' track depth using the map range from the GIS. The 1/3 octave band levels were then combined into a overall vibration level. The overall vibration level was then corrected by –0.07 dB/ft to account for the difference between the track depth and the reference depth.

Trackwork Correction

The locations of special trackwork were identified in the GIS as points. The GIS program was then used to calculate the map distance to the closest trackwork site for each property. Based on the map distance to the trackwork and the depth of the track, an adjustment was made based on +10 dB at a 30' reference distance.

Building Correction

Based on the number of stories, a building correction was added to the vibration level. The building corrections used were; -7 dB for 1-2 story buildings; -10 dB for 3-4 story buildings; and, -12 dB for buildings with 5 or more stories. For the semi-deep option, a zero correction factor was used for 4 buildings on Park Avenue where the alignment passed directly through the basement.

Maximum Vibration Level

For each of the tracks in the alignment, the greatest vibration level was selected as the overall groundborne vibration level for the property.

Goundborne Noise

The groundborne noise level was calculated by subtracting 20 dB from the vibration level.

GIS Database

The groundborne vibration and noise predictions were re-attached to the GIS database for presentation.

7 COMPARISON - PREDICTED VIBRATION LEVELS AND MEASURED DATA

During the transfer mobility testing in Queens, the vibrations from a number of subway passes were recorded. At the Queens test location, the subway tracks are supported on the roof of the LIRR tunnel.

Figure C7.1 shows the predicted vibration spectrum directly above the tunnel using the LIRR model. The spectrum corresponds to a tunnel depth of 84' and a train speed of 30 mph. No corrections were made for building coupling. The second curve is the actual vibration spectrum that was measured when a subway passed the Queens test location. This spectrum was measured by the 0' sensor that was located directly above the tunnel. The predicted and measured vibration levels are comparable, however, the measured data has more low frequency energy. This is most likely an artifact of the support structure. The subway structure has a characteristic resonance, at which the train vibrations are actually amplified. Above the resonance, the structure tends to attenuate the vibrations. The third curve on Figure C7.1 shows the vibration spectrum that was measured near the MBTA's Red Line in Boston. This spectrum

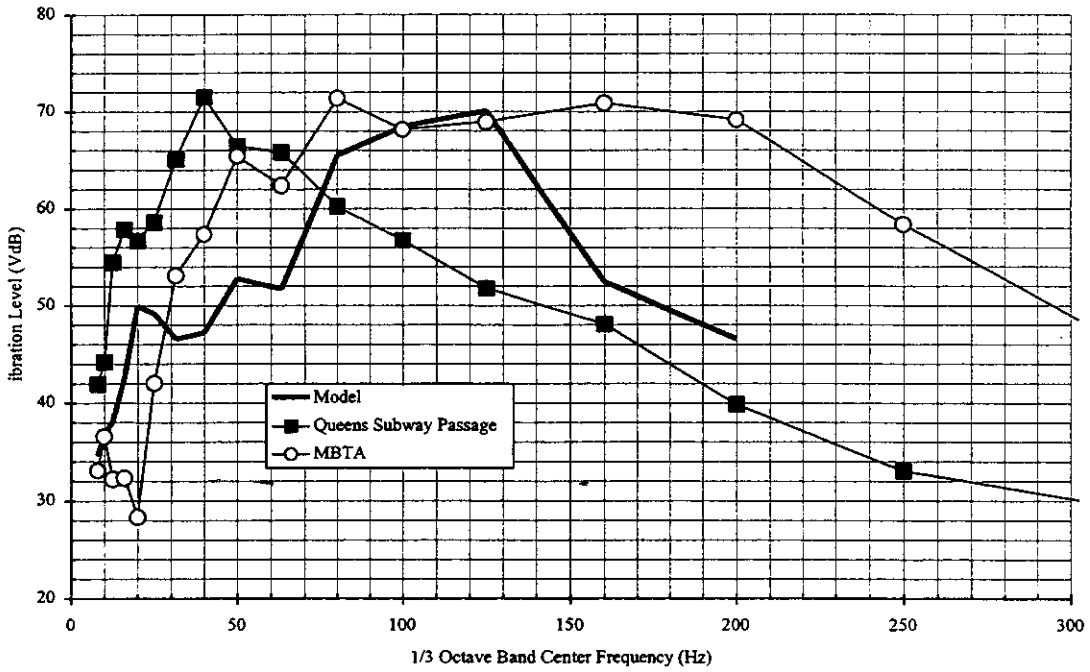


Figure C7.1: Predicted and Measured Vibration Spectra in Queens

was measured for a comparable train speed, at a comparable tunnel depth. As can be seen from this figure, the MBTA data has much more high frequency content, which supports the premise that the lack of high frequency energy in the Queens subway spectrum is likely caused by the

track support structure. This comparison shows that the TM Model agrees reasonably well with actual measured train vibration data for a given speed and tunnel depth.

Appendix D: Historic and Archaeological Resources

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE

Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

November 10, 1999

Ms. Claudia Cooney
Historian
Allen King Rosen & Fleming, Inc.
Environmental and Planning Consultants
117 East 29th Street
New York, New York 10016-8022

RE: MTA/Long Island Rail Road East Side Access Project
New York and Queens Counties
95PR1757

Dear Claudia:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning your project's potential effect upon historic and cultural resources in the proposed project area. I have reviewed the information you submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966.

Based upon the documentation provided, we have determined that the following properties appear to meet the criteria for inclusion in the National Register of Historic Places, as indicated on the attached Resource Evaluations:

Vanderbilt Avenue Building, 51 East 42nd Street, Manhattan
Yale Club, 50 Vanderbilt Avenue, Manhattan
Vanderbilt Concourse Building, 52 Vanderbilt Avenue, Manhattan
Graybar Building, 420 Lexington Avenue, Manhattan
Switch Tower Q, Sunnyside Yard, Queens
Former Signal Cabin F, Sunnyside Yard, Queens.

The following four do not appear to meet the National Register criteria:

47 East 44th Street, Manhattan
270 Park Avenue, Manhattan
Stores & Lavatory Building (Bldg. #3), Sunnyside Yard, Queens
Electric Battery/Machine Repair Building (Bldg. #4), Sunnyside Yard, Queens.

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If you have any questions please don't hesitate to call me at (518) 237-8643, ext. 3266. When responding, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

Cc: Gina Santucci, NYCLPC

Enc.: Resource Evaluations

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Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Yale Club MCD: Manhattan

ADDRESS: 50 Vanderbilt Avenue COUNTY: New York Co.

PROJECT REF: 95 PR 1757 USN: 06101.010659

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Yale Club of New York is architecturally significant under Criterion C as an intact representative example of an early twentieth century Renaissance Revival style building in New York City. It was built in 1915 by the Yale Leasing Company and designed by James Gamble Rogers. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network.

The Yale Club of New York was founded in 1897 by an active local alumni association. The club chose to locate on Vanderbilt Avenue in large part due to the proximity to Grand Central Terminal (GCT) and its commuter trains to New Haven, Connecticut. The structure, built over

the railroad tracks, had an underground pedestrian connection to GCT, allowing members direct access to the club from the station.

The building exhibits features associated with the Renaissance Revival style including a rusticated limestone base, a symmetrical entrance façade, monumental pilasters, brick quoins, round arched window openings at the second and 21st floor, and a prominent bracketed copper cornice. The 21-story building consists of a variety of public rooms, including dining rooms, library, lounge, card room, social room, and gymnasium, as well as 158 bedrooms. The club's public spaces, including the lobby, are elegantly designed spaces with classical detailing, including moldings, columns, pilasters, and coffered ceilings.

The Yale Club was one of 23 buildings erected over the GCT track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building by Claudia Cooney, Allee King Rosen & Fleming, Inc., Oct. 1999.

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Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99
PROPERTY: Vanderbilt Avenue Building
ADDRESS: 51 East 42nd Street
PROJECT REF: 95 PR 1757

STAFF: Kathy Howe
MCD: Manhattan
COUNTY: New York Co.
USN: 06101.010658

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Vanderbilt Avenue Building at 51 East 42nd Street is architecturally significant under Criterion C as an intact representative example of an early twentieth century Renaissance Revival style commercial office building in New York City. It was erected as a six-story building by the American Real Estate Company in 1913 with the upper eleven stories added in 1924. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network. The building has a direct below-grade connection to Grand Central Terminal. It gains additional significance as a fine example of the work of the prominent architecture firm of Warren & Wetmore.

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The original six-story building is clad in stone and features window bays notable for their decorative metal panels, classical terra cotta columns and arched pediments. The structure is capped by an attic story with decorative plaques and a dentil cornice. The eleven-story addition is composed of buff brick and topped by a two-story attic with decorative terra cotta ornament and a cornice.

The firm of Warren & Wetmore is noted for their design of railroad stations, including their joint design of Grand Central Terminal with Reed & Stem. The firm is also well known for hotel designs, including several hotels built in the Grand Central Terminal area. Other buildings designed by Warren & Wetmore within Terminal City included the Grand Central Terminal Post Office, the New York Central Building, Grand Central Palace (demolished), and the Vanderbilt Concourse Building. Many of the firm's designs reflected the Beaux Arts Classical tradition.

The Vanderbilt Avenue Building was one of 23 buildings erected over the Grand Central Terminal (GCT) track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

Changes to the building – including window replacement, alterations to the main entrance, and ground-floor storefront alterations – have not resulted in the removal of notable exterior features. The building retains a sufficient level of historic architectural integrity and is a good example of the work of Warren & Wetmore.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building by Claudia Cooney, Allee King Rosen & Fleming, Inc., Oct. 1999.

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New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Graybar Building MCD: Manhattan

ADDRESS: 420 Lexington Avenue COUNTY: New York Co.

PROJECT REF: 95 PR 1757 USN: 06101.010661

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Graybar Building at 420 Lexington Avenue is architecturally significant under Criterion C as an intact representative example of a 1920s office building in New York City. The 31-story brick and limestone clad building was the largest office building in the world at the time of its construction. It was built primarily as an office building for the Graybar Electric Company. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network. The building was erected in 1925-27 by developer John R. Todd, who later became known for his involvement with the construction of Rockefeller Center. It gains additional significance as a fine example of the work of the architecture firm of Sloan & Robertson. The firm specialized in institutional and commercial designs, most frequently in the Art Deco style.

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The building is composed of two pavilions, with an exterior light court in between, that rise above a two-story base. The limestone base was designed in an eclectic mix of Moorish and Classical detailing, including decorative limestone and cast iron window grilles, a flagstaff above the central entrance with a Moorish band decorated with bronze and colored terra cotta, and flat, sculpted bas-relief figures, symbolizing Transportation and Electricity at the central entrance and similar figures representing the four elements – Earth, Air, Fire and Water – above the northern and southern entances. In contrast, the upper stories of the building, clad in buff brick, are relatively simple.

Significant intact interior spaces include the connecting concourse to Grand Central Terminal; and the vestibule, lobby and elevator hall. The concourse has vaulted ceilings with an allegorical painting of transportation by artist Edward Trumbull; walls and arches clad in Travertine; and a terrazzo floor. The interior of the vestibule/lobby and elevator banks are also richly detailed including Travertine-clad walls, mirrors with bronze work above, and a ceiling with a brightly painted geometric Moorish design.

The building was one of 23 buildings erected over the Grand Central Terminal (GCT) track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

The building retains a relatively high degree of architectural integrity and is a significant example of Sloan & Robertson's work.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building, Oct. 1999, by Claudia Cooney, Allee King Rosen & Fleming, Inc.

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RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Signal Tower F MCD: Queens

ADDRESS: Sunnyside Yard, west of Thomson Ave. viaduct COUNTY: Queens Co.

PROJECT REF: 95 PR 1757 USN: 08101.009219

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The former Signal Tower F in the Sunnyside Yard in Queens is significant under Criterion C as an intact example of an early twentieth century signal tower. Historic railroad signal towers are becoming a rare surviving building type due to changes in technology. The building is also important for its association with transportation history.

Signal towers are structures containing track switching and signaling equipment. When the switches were manned, operators needed to actually see the tracks and switches. Above-ground towers were usually located along side tracks in the yards. Signal towers are becoming

more rare as manual switches have been replaced by remote control panels and automatic devises, many now placed in rooms within stations or consolidated into master towers in yards.

This building is one of three surviving signal cabins erected in Sunnyside Yard by the Pennsylvania Railroad Company in 1910. Historic documents describe the cabin to be of "standard Pennsylvania Railroad type." The small brick building is two-stories with a slate-clad hipped roof and stone sills and lintels. It has a bay window on the south façade.

The former Signal Tower F houses now communication wires and appears to be in fair condition, although some of the entrances and windows have been bricked or boarded up and modern windows have been installed. On the whole, the tower appears to maintain a sufficient level of historic architectural integrity. It is not known what elements of the historic equipment survive in this signal tower. Any future documentation of the building should include an investigation of the equipment.

In 1901, the Pennsylvania Railroad adopted a plan to lay out a large railroad yard at Sunnyside and to build a system of tunnels from New Jersey to Manhattan and out to Queens. Sunnyside Yard opened in 1910, with Long Island Rail Road (LIRR) service commencing in September and Pennsylvania Railroad service in November of that year. The New York Tunnel Extension project provided an all-rail line to a centrally located Penn Station in New York City. The purpose of the Sunnyside Yard was to furnish facilities for the storage and care of passenger train equipment.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

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Historic Preservation Field Services Bureau
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RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Signal Cabin Q/Yardmaster's Office MCD: Queens
(present Switch Tower Q)

ADDRESS: Sunnyside Yard, east of Queens Blvd. viaduct COUNTY: Queens Co.

PROJECT REF: 95 PR 1757 USN: 08101.009218

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

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B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The former Signal Cabin Q/Yardmaster's Office (now known as Switch Tower Q) in the Sunnyside Yard in Queens is significant under Criterion C as an intact example of an early twentieth century signal tower. Historic railroad signal towers are becoming a rare surviving building type due to changes in technology. The building is also important for its association with transportation history.

Signal towers are structures containing track switching and signaling equipment. When the switches were manned, operators needed to actually see the tracks and switches. Above-

ground towers were usually located along side tracks in the yards. Signal towers are becoming more rare as manual switches have been replaced by remote control panels and automatic devises, many now placed in rooms within stations or consolidated into master towers in yards.

This building is one of three surviving signal cabins erected in Sunnyside Yard by the Pennsylvania Railroad Company in 1910. It was built for combined use as a signal cabin and yardmaster's office. Historic documents pertaining to the construction of Sunnyside Yard describe it as "special" and different from the "standard Pennsylvania Railroad type" due to its design with extensions to contain the yardmaster's offices and tool rooms.

The brick building consists of a two-story block flanked by one-story wings. It has slate-clad hipped roofs, stone lintels and sills, and a bay window on the north façade. The structure is still in use as a switch tower and appears to be in fair condition, although some of the entrances and windows have been bricked or boarded up and modern windows have been installed. On the whole, the tower appears to maintain a sufficient level of historic architectural integrity. It is not known what elements of the historic equipment survive in this signal tower. Any future documentation of the building should include an investigation of the equipment.

In 1901, the Pennsylvania Railroad adopted a plan to lay out a large railroad yard at Sunnyside and to build a system of tunnels from New Jersey to Manhattan and out to Queens. Sunnyside Yard opened in 1910, with Long Island Rail Road (LIRR) service commencing in September and Pennsylvania Railroad service in November of that year. The New York Tunnel Extension project provided an all-rail line to a centrally located Penn Station in New York City. The purpose of the Sunnyside Yard was to furnish facilities for the storage and care of passenger train equipment.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

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Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/9/99

PROPERTY: Vanderbilt Concourse Building

ADDRESS: 52 Vanderbilt Avenue

PROJECT REF: 99 PR 1757

STAFF: Kathy Howe

MCD: Manhattan

COUNTY: New York Co.

USN: 06101.010660

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Vanderbilt Concourse Building at 52 Vanderbilt Avenue is architecturally significant under Criterion C as an intact representative example of an early twentieth century Renaissance Revival style commercial building in New York City. It was built by the Vanderbilt Concourse Corporation in 1914 to house stores, offices, and lofts. The corporation acquired the site under a long-term lease from the New York Central & Hudson River Railroad. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network. It gains additional significance as a fine example of the work of the prominent architecture firm of Warren & Wetmore.

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The 20-story building consists of a buff-colored brick façade above a six-story limestone base. Characteristic features of the Renaissance Revival style include the three-part composition, ornate carved panels, three-story round-arched window openings at the upper floors with keystones and a balcony, and prominent cornice. In the interior, the vestibule/elevator bank area also appears to retain original detailing, including a gilded plaster barrel vault ceiling and ornate bronze elevator doors.

The firm of Warren & Wetmore is noted for their design of railroad stations, including their joint design of Grand Central Terminal with Reed & Stem. The firm is also well known for hotel designs, including several hotels built in the Grand Central Terminal area. Other buildings designed by Warren & Wetmore within Terminal City included the Grand Central Terminal Post Office, the New York Central Building, Grand Central Palace (demolished), and the Vanderbilt Avenue Building. Many of the firm's designs reflected the Beaux Arts Classical tradition.

The Vanderbilt Concourse Building was one of 23 buildings erected over the Grand Central Terminal (GCT) track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

The building retains a relatively high degree of architectural integrity and is a significant example of the work of Warren & Wetmore.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building by Claudia Cooney, Allee King Rosen & Fleming, Inc., Oct. 1999.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE

Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189
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November 29, 1999

Claudia Cooney
Historian
Allee King Rosen & Fleming, Inc.
Environmental Consultants
117 East 29th Street
New York, New York 10016-8022

RE: MTA/Long Island Rail Road East Side Access Project
Queens County
95PR1757

Dear Claudia:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning your project's potential effect upon historic and cultural resources in the proposed project area. I have reviewed the information you submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966.

Based upon the documentation provided, the following properties do not appear to meet the criteria for inclusion in the National Register of Historic Places:

*Building #5, Sunnyside Yard
*2950-2970 Northern Boulevard, Long Island City
*3856-3864 43rd Street, Long Island City
*Barnett Avenue garages, 44-11 through 43-05 Barnett Avenue, Sunnyside
*44-15 Barnett Avenue, Sunnyside
*44-25 Barnett Avenue, Sunnyside
*45-15 Barnett Avenue, Sunnyside
*4701/4707/4715 Barnett Avenue, Sunnyside.

Please note that while the Barnett Avenue garages are not eligible, they are located directly across the street from the National Register listed Sunnyside Gardens. Therefore, we will need to review the project's plans for that site for any potential effect.

If you have any questions, please don't hesitate to call me at (518) 237-8643, ext. 3266. When responding, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

cc: Gina Santucci, NYCLPC

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER
05/25/99 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

w/in project study area

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

COMMENTS

Work plan for EIS preparation appears adequate for architecture and archaeology. Site plans showing locations of proposed in-ground construction, showing existing and proposed conditions, are needed before LPC can complete the assessment of archaeological impacts.

The study area boundaries map for historic resources in Manhattan does not contain any properties which are calendared for public hearing or are potentially eligible for New York City landmark designation. The following properties within the study area are New York City individual landmarks: The Seagram Building, 375 Park Ave., the Waldorf Astoria, 301 Park Ave and the New York Central Building, 230 Park Ave. The following properties within the study area are New York City individual landmarks and listed on the State/National Registers: Lever House, 390 Park Ave; The Racquet and Tennis Club, 370 Park Ave; St. Bartholomew's Church, Park Ave and E. 50 St; and Grand Central Terminal.

cc: SHPO

Gina Santucci — SIGNATURE
06/04/99 — DATE

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643

June 21, 1999

Ms. Pamela Burford
Director, Planning and External Relations
Long Island Rail Road
Jamaica Station
Jamaica, New York 11435-4380

RE: MTA/Long Island Rail Road East Side Access Project
New York, Bronx, Queens Counties
95PR1757

Dear Ms. Burford:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning the identification of the areas of potential effect (APEs) for cultural resources for the Build Alternative for the MTA/Long Island Rail Road East Side Access Project. We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. Based upon this review, the OPRHP concurs with the architectural and archaeological assessments of APEs for your project.

Please be sure to refer to the OPRHP Project Review (PR) number noted above for any further correspondence.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

An Equal Opportunity/Affirmative Action Agency
printed on recycled paper

MTA/LIRR EAST SIDE ACCESS PROJECT
ROUTING AND DISTRIBUTION LIST

Sub Job 001 Rec Type RT Comm Date 12/14/1999 Admin Rec N CCN-Item No. 003933-1

Subject APPENDICES FOR THE PRELIMINARY DRAFT ENVIRONMENTAL IMPACT STATEMENT

From JAPHA Org MTA To THOMPSON Org FTA File Loc M Closes CCN

Comm Reference Published N

Cross Reference (Affected Doc) Field CCN

Site Codes

Subject Codes 02810 17000 Film Reel

Owed By Org Due Date Closing CCN

Owed To Org Forecast Date Compl Date

Comment/Action

003933-1

CODE: I = Information A = Action R = Routing

FUNCTION	NAME	CODE	W/A	W/O	FUNCTION	NAME	CODE	W/A	W/O
					Tunnel Engineer Project Director	J. Forman			
Chief Program Executive	A. F. Japha				Tunnel Eng'r Deputy Project Director	N. Munfah			
Deputy Chief Program Executive	H. Sackel				DPM - Facilities	J. Marchese			
Chief Design Constr. & RR Operations	M. J. Kaleda				Deputy Proj. Director, Tunnel Eng'r	M. Gagliardi			
Director RR Operations Coordination	R. A. McDermott				Project Controls Manager	J. Ligammari			
Chief Financial & Admin. Officer	J. Petrocelli								
Director Planning & External Relations	P. M. Burford				Systems Engineer Project Manager	R. Tansill			
Director Budgets	S. Jurman				Manager - Package Coordination	S. LaRocco			
Director Design	R. Magnifico				Principal Engineer - Service Delivery	K. Haggas			
Director Project Management	R. Petrides				Design Manager - Facilities	J. Abrams			
Sr. Manager, Procurement & Risk	D. Cannon				Design Manager - GCT/Lex Design	K. Griffin			
Senior Project Manager	M. Daniels				Project Control/Admin. Manager	W. Stanton			
Project Manager, Compliance	H. Caso								
Senior Manager, Operations	R. Spero								
					DPM Project Services	J. Williams			
Program Manager	G. Morschauser				Contracts & Procurement Mgr.	G. Dassow			
DPM Technical Management	A. Bast				Consultant Contract Administration	N. Riely			
DPM Operations and Integration	P. Allibone				Contract Administrator	R. Slowinski			
Operations & Integration Proj. Engineer	K. Hunt				Lead Cost Engineer	L. Temple			
Senior Signal Engineer	F. Wilczewski				Lead Scheduling Engineer	R. Parker			
Senior Traction Power Engineer	D. Rhoads				Cost / Schedule Engineer	A. Dilancea			
Senior Operations Analyst	D. Dure				Scheduling Engineer	M. DeBernardo			
TEC Manager	S. Brisbin				Procurement Administration	J. Luckstone			
SEC Manager	G. Rees				Lead Estimator	J. Ratner			
Force Account Manager	M. Moskowitz				Civil Estimator	S. Ceyyur			
Force Account Coordinator	B. Strout				Project Administrator	S. D. Smith			
Force Account Scheduler/Estimator					Configuration Manager	R. Hille			
EC Manager	R. Tillman				Reports Manager	J. Eustace			
Environmental Consultant Coordinator	A. Heffernan		✓		Management Information Systems Mgr.	G. Manalastas			
Environmental Project Engineer	T. Freeman				Finance & Administration Manager	H. Landmann			
Senior Constructability Engineer	L. Renegar								
QA Manager	D. Jinnett				Additional Distribution				
Community Relations Manager	S. Gilbert								
Railroad Operations Coordinator	E. Boni								
Design Area Manager - Queens Tunnels	J. Moss								
Design Area Mgr. - Manhattan Tunnels	D. O'Neill								
Design Area Manager - Architectural	B. Taylor				Record Copy	Sensitive File			
Geotech/Tunnel Review Engineer	L. Weller				Record Copy	Master File		✓	

COMMENTS: